WOODY VINES OF THE SOUTHEASTERN STATES

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Woody vines have rarely been treated as a separate group in respect to guides or systematic studies. Instead they have usually been included with treatments of other vascular plants, sometimes with the shrubs which generally have been much neglected. In temperate or cold climates woody vines are easily delimited, much more clearly than are trees from shrubs. Therefore, it is logical to treat the woody vines as a group.

The species included in this study are woody vines which are native to some part of the Southeastern States or were introduced to the area and have escaped and reproduced naturally in one or more localities. Included among the escapes, for example, are *Lonicera japonica* which reproduces abundantly both vegetatively and by seeds, *Pueraria lobata* which rarely reproduces by seeds but spreads rapidly vegatively, and *Hedera helix* which probably spreads by vegetative means only. Two species, *Ampelopsis aconitifolia* and *Periploca graeca,* are known from only one locality each. There may be other species which have escaped but which I have not observed or for which I have not seen a documenting specimen. Other introductions which are used in some areas as ornamentals do not seem to have become established permanently outside of domestication and are not included here. Some of these, such as *Ficus pumila* L., may be shown later to be escapes.

Opinion varies as to just what constitutes a woody vine. In order to establish for others the scope of this study it is best to define the criteria employed here. One requirement is that in some part of the Southeastern United States, some individual of a species be known to have aboveground stems which live over one year to the next through the winter freezes. A second criterion is that some individuals be able to climb as a result of some specific activity in addition to mere growth in length; such activities include twining, or the use of tendrils or aerial roots. Included, therefore, are species which in the colder parts of their range have individuals without stems persisting above the ground during some winters. *Clematis virginiana,* for example, sometimes dies back to the ground, or nearly so, during the winter, yet in the mountainous Blue Ridge Province a stem is known to have persisted for several years to 13 feet above the ground. Included also is *Smilax pumila,* a species of the Coastal Plain, low in stature, often trailing, but occasionally low climbing by means of tendrils and having aboveground stems clearly persisting over the winter season. Omitted are various species which climb to a few to many feet, but during the winter die

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back to near the ground, producing during the following growing season new growth from these short aboveground stems.

Of the criteria regarding climbing, twining of stems is an easily observed character as likewise is the twining of the leafstalks of *Clematis virginiana*. The presence of aerial roots also is easily seen. However, in *Parthenocissus* the tendrils are short and usually tipped with discs and sometimes may be misinterpreted as roots. Otherwise tendrils are distinct structures. They may be either stems as in *Vitis*, stipules *(Smilax)*, or reduced leaflets *(Anisostichus)*.

The above criteria for climbing involve specific activities other than the matter of growth in length of stems. I have omitted from the woody vines, therefore, species such as *Sagereta minutifolia* (Michx.) Trel. and *Rosa multiflora* Thunb. which are deemed climbers by some, but which do nothing more than grow abundantly in length and merely rest on other plants and objects for support. Included is *Pieris phillyreifolia* whose stems often follow the crevices in the bark or force a path between the outer and inner bark of *Taxodium ascendens* Brongn.

Much consideration was given to the problem of the geographical limits for this study. The point of departure was that area covered by Small's (1933) *Manual of the Southeastern Flora*. The decision in regard to areas that should be dropped and those to be added was based largely on evaluation of the natural distribution of woody species (trees, shrubs, and vines). The addition of Louisiana, Arkansas, Kentucky, Virginia, West Virginia, Maryland, and Delaware to the area involves no additional species of woody vines and only a few species of trees and shrubs. Including any one additional state adds a significant number of woody species. Therefore, it seems best to include in the area of this study the seven states named above, each of whose woody flora is so similar to that of adjacent parts of the Small's *Manual* range, and to exclude all additional states. These exclusions seem justified also because part of the area of each omitted state has additional woody species which are more characteristic of other types of floras than those in the Small's *Manual* range.

In peninsular Florida the criteria set up for woody plants are sometimes difficult to interpret. There are areas, especially in the southern part of the peninsula, which are often free of freezing and aboveground stems of many species live from year to year. The farther south one goes the more difficult it is to decide, under the test of the aboveground stem living through winter freezes, whether or not a species is woody, and a sensible list of woody plants is difficult to compile. Fortunately, a southern boundary may be established reasonably on a different basis north of the area where it is difficult to decide for many species whether or not they are woody.

By extending the area of the present study south of Georgia to the

southern boundaries of Pasco, Sumter, Lake, Orange, and Volusia Counties, Florida, only two species of woody vines, *Vitis shuttleworthii* and *Passiflora pallida* and a few species of trees and shrubs are added to the list of woody plants for the Southeastern States under an interpretation that a woody plant is one in which most of the main aboveground stem lives for a period of several years. It is assumed that the stems of some of the species might die to the ground during the "killer" freezes which usually occur at intervals of a good many years.

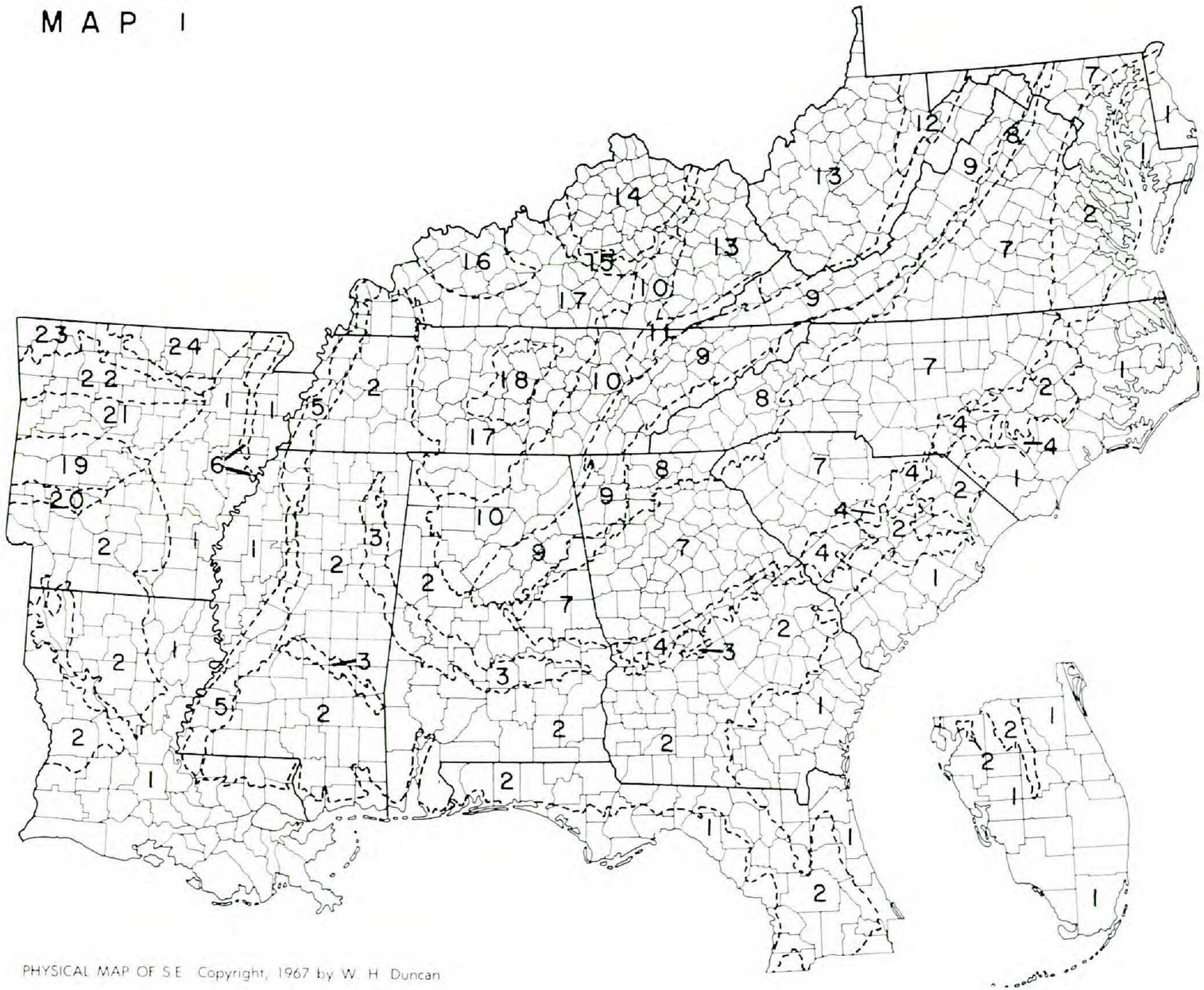
Should the next tier of counties (five) to the south be included in the area, several woody species would be added and the problem of deciding whether or not other species were woody would present considerable difficulty. Furthermore, these additional species are characteristically more subtropical in affinity than temperate, of which almost all of the woody vines of this study are a part. Therefore, the southern boundaries of the counties named above are a logical choice for the southern limits of the present study.

The area for this study is indicated by Map 1. The remainder of Florida is included so that distributions of the species occurring in the study area can be indicated by county for all of Florida. The map also shows physical regions for the Southeastern States. The boundaries of the physical regions were established after exhaustive search for and studies of published materials, some having appeared during the last year.

The regions are based largely on a combination of classification of soils, physical relief, and the underlying geological formations; they are not intended to reflect the distribution of plants but rather to aid in the interpretation of their distribution. The designations for most of the regions may be recognized as those generally employed in current physiographic maps of the area although the boundaries are often different. A few designations are my adaptations and are designed to describe the regions. Edaphic and physical features within some regions are sometimes widely and abruptly divergent. For example, in the Piedmont of Georgia there are the deep fertile soils on one hand and the granitic outcrops on the other. The Lower Coastal Plain includes coastal dunes, salt marshes, flatwood pineland areas, swamps, sandhills associated with rivers, and other types of features. Such features are often important in respect to plant distribution. It is impossible, however, to indicate most of these features on any but large scale maps. In addition, detailed data concerning physical aspects of many areas are lacking, and it is impossible to subdivide on a uniform basis an entire region such as the Lower Coastal Plain.

My studies of woody plants of the Southeastern States have covered a period of over twenty-five years. They began with an attempt to recognize all woody taxa under the interpretations of current authors, to establish more definitely distributions for the taxa, and to interpret

MAP I



PHYSICAL MAP OF S.E. Copyright, 1967 by W. H. Duncan

PHYSICAL MAP OF THE SOUTHEASTERN STATES

better the vegetation of the Southeast. These endeavors soon showed that the then current interpretations of many taxa differed from author to author and/or needed modifications. Therefore I added the matter of solving some of the taxonomic problems to my endeavors. Every opportunity allowed by teaching responsibilities was taken to study collections in herbaria and to get into the field and obtain data and specimens. Few attempts were made to conclude studies of any particular group of species to the extent that publication of the results would be justified because overall studies in the field are more economical in terms of time and costs than studies concerning only a few species. The studies have now reached a point where it seems appropriate to place certain conclusions into print.

Some of the taxonomic problems encountered have been solved to my satisfaction; others definitely have not and need further study. Even in such cases a setting down of interim conclusions and a discussion of some of the relationships between and the nature of the taxa involved should be valuable in helping establish the character of future studies. The tabulated distribution records which were obtained from specimens in 36 herbaria* during the last eleven months allow a realistic appraisal of the numbers of specimens available for taxonomic studies from the various areas of the Southeast. It is clear that over large areas little or no additional field work is needed to obtain sufficient general collections, especially for floristic studies. It is equally evident that considerably more work is required in other areas. However, the amount of general collecting needed in the Southeast does not reach the proportions that apparently have been assumed by some students of the flora. General collections from much of the Southeast seem sufficient to allow intelligent planning of most systematic studies. Special additional collections will, of course, be needed from all areas for the various systematic studies which will undoubtedly be made.

Many persons have contributed to the data that are presented and their help is gratefully acknowledged. Information useful in preparation of the physical map was received from numerous individuals. The curators of all the herbaria which I either visited or from which I received data or specimens on loan were all most generous with their attention. Other individuals, both at the University of Georgia and elsewhere, contributed specimens and data which were helpful. Wayne Faircloth, in particular, during part of a summer developed keys many of which have been modified and used here. The illustrations were drawn by Mrs. Delia McClung, many being from living materials. Financial support for some of the more recent portions of the study was received through Dr. Robert McRorie, Director of General Research, University of Georgia, and Dr. Lloyd Shinners, Southern Methodist University;

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* See Appendix for list of herbaria.

earlier portions of the study were supported financially through a number of other sources.

The material to follow places emphasis on those characteristics and relationships of taxa in which my interpretations differ from those in the more recent manuals. Descriptive and explanatory materials are generally omitted for those taxa for which my interpretation and those of the other manuals are essentially the same. When our interpretations are the same and an identical scientific name is used no reference to other manuals is given. If the scientific name applied to a taxon is different or if my interpretation of taxa differs from that of the other manuals, the scientific names involved in the other manuals are indicated and identified to source by abbreviations as follows:

F—Fernald, M. L., 1950, *Gray's Manual of Botany*, American Book Company, New York.

G—Gleason, H. A., 1952, *The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada*—3 volumes, The New York Botanical Garden, New York.

GC—Gleason, H. A. and Cronquist, A., 1963, *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*, D. Van Nostrand Company, Inc., Princeton, N. J.

R—Radford, A. E., et al., 1964, *Guide to the Vascular Flora of the Carolinas*, University of North Carolina Book Exchange, Chapel Hill, N. C.

S—Small, J. K., 1933, *Manual of the Southeastern Flora*, University of North Carolina Press, Chapel Hill, N. C.

SC—Strausbaugh, P. D. and Core, E. L., 1964, *Flora of West Virginia*, West Virginia University Bulletin, Morgantown, W. Va.

Full names of the authors sometimes are used. Scientific names listed as synonyms and without a designating abbreviation are from authors other than the above. The keys are mostly artificial, being designed for those persons who are relatively unfamiliar with woody vines.

From the above discussion it may be seen that much of the material presented below involves descriptions or explanations of those of my conclusions which differ from interpretations of other current authors. Under such an arrangement most of the repetitious descriptive material can be omitted without significantly affecting the reader's ability to understand what is presented. The manuscript has also been shortened by other means. A number of words are abbreviated and periods omitted following them. Numbers higher than "one" usually are not written out. The word "leaves" is used to refer to "blades of the leaves" unless otherwise indicated. Instead of an index, generic numbers from Dalla Torre and Harms' *Genera Siphonogamarum* are used as a reference in going from the general key to the treatment of the genera and to the distribution maps. When distribution records are few the maps are omit-

ted and the data given in the text. The data on the distribution maps are from two sources, herbarium specimen records which are indicated by black circles and observations in the field which are indicated by triangles.

I decided many years ago that there was little justification for placing specimens in the herbarium to document a detailed record of plant distribution by counties. It seemed more logical in many cases to obtain and file a single specimen from one county of each group of counties which were physically similar, and to record sight records from the other counties. I began tabulation of such records in ledger books and followed that by notching records on Key Sort cards. Since 1952 most observations have been recorded on a dictating machine run from the electrical system of the field automobile. Some plants were observed from the automobile. An eight-power binocular was often used in the automobile, and when I was away from it as well. Often specimens collected in the field were placed in a vasculum, a plastic bag, or even in my pockets, and upon my return to the automobile they were recorded by taxon on the dictating machine. Distribution records of the more easily identified common species, e.g., *Smilax glauca* and *Pueraria lobata*, were frequently recorded by dictation. Uncommon species and/or those easily confused with another taxon were usually documented with herbarium specimens.

The presence of species in any of the states adjacent to the SE is indicated in the text.

The chromosome numbers of species are indicated by numerals in the parentheses following the statement of distribution outside the SE. The numbers are all sporophytic although some values were calculated from reported gametophytic numbers. A parenthesis without a number indicates that no published chromosome number was discovered. No check was made concerning whether or not having two different numbers for the same taxon was due to misidentification.

KEY TO GENERA

a. Leaves compound (in *Cissus* some leaves, but not all, only deeply 3-parted . . . . . b

b. Leaves opposite. c

c. Leaves of two ovate to oblong entire leaflets and a branched tendril with adhesive discs by which the plants climb. . . . . 7705. ANISOSTICHUS

c. Leaves of 3 or 7-13 toothed leaflets and no tendrils; the plants climbing by aerial roots or twisting leaf stalks. . . . . d

d. Leaflets 7-13; climbing by aerial roots; corolla tubular. . . . . 7714. CAMPSIS

d. Leaflets 3; climbing by twisting leaf stalks; corolla none; the sepals petal-like and separate. . . 2542. CLEMATIS

b. Leaves alternate. . . . . e
e. Leaflets with a small notch in the otherwise rounded apex, the margins entire. . . . . 2555. AKEBIA
e. Leaflets with an acute or obtuse apex, the margins serrate, dentate, lobed, or entire. . . . . f
f. Plants climbing by aerial roots; leaflets 3 (or rarely 5) and pinnate; fruit drupaceous. . . 4594. TOXICODENDRON
f. Plants climbing by twining or tendrils (the tendrils sometimes similar to roots and having adhesive discs on their ends); leaflets 3 to many, palmate or pinnate; fruit a legume or 1—4-seeded berry. . . . . g
g. Stems twining, plants without tendrils, fruit a legume. h
h. Leaflets 3, the largest 10 cm or more long. . . . . 3889. PUERARIA
h. Leaflets 7-19, the largest under 10 cm long. . . . . 3722. WISTERIA
g. Stems not twining, plants with tendrils (one species with adhesive discs on the ends), fruit a 1—4-seeded berry. i
i. Leaves bi-pinnately or (partially tri-pinnately) compound, the leaflets many. . . . . 4916. AMPELOPSIS
i. Leaves palmately compound (or apparently so), leaflets 3-5 . . . . . j
j. Leaflets 3, tendrils opposite all or most nodes. . . . . 4918. CISSUS
j. Leaflets 5, rarely some also 3. . . . . k
k. Leaflets evenly finely to coarsely serrate above an entire basal portion, tendrils tipped with adhesive discs. . . . . 4915. PARTHENOCISSUS
k. Leaflets pinnately lobed, often divided nearly to the midrib; tendrils with no discs. . . . . 4916. AMPELOPSIS
a. Leaves simple (some deeply lobed). l
l. Leaves opposite or rarely whorled. . . . . m
m. Stems climbing by aerial roots. . . . 3222. DECUMARIA
m. Stems climbing by twining. . . . . n
n. Leaves narrowly linear, the largest under 4 mm. wide; plant often profusely branching. . . . 6797A. CYNANCHUM
n. Leaves much wider. . . . . o
o. Lacking stipules but the stem usually with lines between opposing leaves; leaves deciduous or semi-evergreen; fruit fleshy, a berry. . . . . 8523. LONICERA

o. Bearing sharp-pointed, triangular, often elongated stipules either on the petiole base or adjacent stem, the stipules sometimes early deciduous; either with or without stipular lines between opposing leaves; leaves deciduous or evergreen; fruit dry and dehiscent at maturity. . . . . p

p. Leaves evergreen, leathery, glabrous; corolla conspicuously yellow, the tube over 15 mm long; fruit a 2-celled capsule, flattened contrary to the partition; seeds without hairy tufts at ends. . . . . 6447. GELSEMIUM

p. Leaves deciduous, not leathery, sometimes pubescent; corolla pale yellow to brownish, rotate or with a tube to 7 mm long; fruit of a single or twin follicles; seeds with hairy tufts at ends. . . . . q

q. Lateral veins of leaves uniting to form a marginal vein about one mm from the edge; corolla rotate. . . . . 6733. PERIPLOCA

q. Lateral veins of leaves gradually tapering until indistinct very near the margin, where essentially parallel with it; corolla with a tube about 7 mm. long. . . . . 6667. TRACHELOSPERMUM

l. Leaves alternate. . . . . r

r. Pith lacking; the stems solid except sometimes for scattered pores, with scattered vascular strands; tendrils arising in pairs from the petioles of leaves; prickles often present on stems. . . . . 1151. SMILAX

r. Pith present or stems rarely hollow; tendrils absent or if present not arising from the petioles of leaves; no prickles present on stems. . . . . s

s. Stems growing in fissures of the bark or growing under the outer bark, usually of cypress. . . . . 6200A. PIERIS

s. Climbing by tendrils, aerial roots, or twining. . . . . t

t. Climbing by tendrils or aerial roots. . . . . u

u. Climbing by aerial roots. . . . . 5855. HEDERA

u. Climbing by tendrils only. v

v. Leaves entire and not lobed, ovate; petiole dilated at base and extending into a minutely pubescent ring (stipular) surrounding the stem; tendrils limited to the ends of the branches; stem grooved. . . . . 2206. BRUNNICHIA

v. Leaves toothed or lobed, or if unlobed or entire the stem not grooved (sometimes with soft corky ridges); petioles not as above; tendrils opposite

leaves and thus apparently lateral to stems although basically terminal. . . . . w

w. Petiole bearing two stalked glands between its middle and the blade; stems, except youngest, with tight almost white corky longitudinal strips or sometimes covered with the cork; flowers and fruits one per pedicel, solitary to two in leaf axils. . . . 5372. PASSIFLORA

w. Glands absent from petiole; the stems lacking the whitish cork, older stems sometimes with rough brownish bark or the brownish bark sometimes shredding; flowers and fruits several to many in clusters attached opposite leaves. x

x. Year-old stems having white continuous pith; leaves shallowly serrate or toothed, sometimes lobed; petals spreading at flowering-time and later dropping singly; mature fruit a turquoise blue, not edible; inflorescence a cyme; bark of stems tight. . . . . 4916. AMPELOPSIS

x. Year-old stems having brown pith with cross partitions at the nodes, except in *V. rotundifolia;* leaves palmately lobed or angled, or coarsely toothed; petals separating only at their bases and falling as a unit; mature fruit black or purple, edible although sometimes sour or bitter; inflorescence a panicle; bark or stems of most species loosening into elongated flakes or shreds. . 4909. VITIS

t. Climbing by twining. . . . . y

y. Leaves palmately veined. . . . . z

z. Petiole attached inside the edge of the leaf-blade on the underside (occasionally on some leaves by as little as one mm). . 2567. MENISPERMUM

z. Petiole joining the edge of the leaf-blade at its base. . . . . aa

aa. Leaves not lobed, cordate to broadly ovate; fruit a capsule. . . 2174. ARISTOLOCHIA

aa. Leaves slightly to deeply lobed; fruit a drupe. . . . . bb

bb. Leaves deeply 3—5-lobed, the middle lobe narrower at the base than in the middle; tips of lobes sharply pointed but not mucronate; at least seven veins arising from leaf-

base; the lowermost ones often obscure; bud-area not vertically elongate or hairy; leaves glabrous beneath except for sparse hairs on the larger veins; drupe black, 15-25 mm long and flattened only on one side.
. . . . . 2599. CALYCOCARPUM

bb. Leaves not lobed or only slightly so; leaf-tips mucronate; not more than five (rarely seven) veins arising from the leaf-base, the lowermost ones often obscure; bud-area vertically elongate and densely hairy; leaves silky-pubescent beneath; drupe red, 5-8 mm long and flattened on both sides.
. . . . . 2570. COCCULUS

y. Leaves pinnately veined. cc

cc. Pinnate veins of leaves nearly straight, evenly spaced, and parallel. . . 4868. BERCHEMIA

cc. Pinnate veins of leaves not straight, evenly spaced or parallel. . . . . dd

dd. Leaf-scars orbicular, with three bundle scars; leaf-margin with minute, widely scattered serrations confined mainly to the distal part of the leaf blade; petioles of largest leaves 3-5 cm long. . . . . 2656. SCHIZANDRA

dd. Leaf-scars half circular (truncate beneath the bud), with one bundle scar; leaf-margin with distinct and rather uniformly distributed serrations; petioles rarely over 2 cm long.
. . . . . 4625. CELASTRUS

LILIACEAE — LILY FAMILY

There is only one genus having species which are woody vines. Other taxa are trees, shrubs, or vines.

1151. SMILAX L.

The interpretations of the woody species of this genus in most manuals seem generally correct. However, the abundant misidentifications of herbarium specimens, particularly of sterile ones, indicate difficulties in following these interpretations even by authors of the manuals, and suggest the need for additional diagnostic characters. Specimens of *S. rotundifolia* have often been confused with forms of *S. bona-nox*, *S. tamnoides*, *S. walteri*, and *S. glauca* (especially when herbarium specimens of this taxon have had the glaucous underside of the leaf obscured by drying). The latter four species are also sometimes confused with each other as are *S. lanceolata*, *S. smallii*, and *S. auriculata*. This

last species and *S. bona-nox* have also been confused.

During the present study the major effort was placed on searching for new vegetative characteristics and determining which were reliable. It was found that characters involving the leaf margin and submargin are especially valuable and that some charcteristics are usually more evident in dried than in fresh specimens. Specimens with young leaves and a few with apparently intermediate characters, especially between *S. rotundifolia* and *S. bona-nox*, are occasionally difficult to place. Overlapping peduncle lengths may have caused much of the difficulty in the past. Of all the species, *S. rotundifolia* and *S. bona-nox* seem the most closely related and their apparent intergradation seems more a matter of their having been derived from a common ancestor than one of introgression. *S. bona-nox* also seems closely related to certain populations of *S. tamnoides*. I believe that by placing general emphasis on selected vegetative characters the problems of identification of most specimens to species can be solved. The various varieties that have been proposed do not seem tenable with the possible exception of two in *S. tamnoides*.

The petiole as considered below includes that portion of the leaf that also might be interpreted as a strongly constricted base of the blade.

KEY TO SPECIES OF SMILAX

a. Stems hairy; underside of leaves densely hairy; plants trailing, suberect, or low climbing (up to 7 dm); the berries red. 1—S. PUMILA

a. Stems glabrous (rarely with dark stellate hairs on some portions in *S. bona-nox);* underside of leaves glabrous or rarely minutely hairy; plants sometimes erect but usually high climbing; berries red or black (sometimes covered with a bloom). . . . . b

b. Leaves evergreen, thick-coriaceous, oblong to oblong-linear or oblong-lanceolate to rarely broadly linear, on the underside the midvein in its lower third more prominent than the laterals, a lateral vein closely and evenly submarginal (this is more easily seen in dried leaves), the veins indistinct on the upper surface; stigma one; berries black, 1-seeded, ripening late in the second season after flowering in the previous summer or fall.
. . . . . 2—S. LAURIFOLIA

b. Leaves deciduous or evergreen with leathery to firm-coriaceous but with neither thick nor oblong blades (if oblong, conspicuously veined on the underside), the midvein scarcely or no more prominent than the laterals, with no submarginal vein (unless irregularly spaced along part of the margin—in *S. auriculata),* the veins sometimes distinct on the upper surface; stigmas 2-3; berries black or red, 1—3-seeded, ripening the same year after flowering in the spring (or the summer of the second year in *S. smallii).* c

c. Underside of leaves whitened, silvery, or bluish gray; the leaf margins thin though sometimes rolled when dry, not serrulate, and without a rib; berries black or covered with a bloom and bluish; peduncles longer, usually much longer, than the petioles of the subtending leaves. . . . . 3—S. GLAUCA

c. Underside of leaves about the same green color as the upperside; the leaf margins thin or in one species with a rib; berries black or red, rarely covered with a bloom; peduncles longer or shorter than the petioles of the subtending leaves. . . . . d

d. Peduncles 1.5 or more times as long as petioles of the subtending leaves, sometimes to 7 cm long; berries usually 1-seeded. . . . . e

e. Stems with rigid, broad-based, pale, or merely dark-tipped prickles; leaf margins entire or sparsely spinulose-ciliate, and thickened by a marginal rib (often poorly developed in young leaves and in some shade forms), veins and veinlets usually thickened; leaf drying and fading to a tan color. . . . . 4—S. BONA-NOX

e. Stems with relatively weak, somewhat bristle-like, usually dark prickles; leaf margins minutely serrulate and not thickened, veins and veinlets slender; leaf drying and fading to a dull ashy green color. 5—S. TAMNOIDES

d. Peduncles less than 1.5 times as long as petioles of the subtending leaves, or if longer, the stems without dark slender prickles or leaves without a marginal rib, berries 1—3-seeded. . . . . .f

f. Leaves lanceolate to elliptic-lanceolate, smooth margined (use 10X lens), the base broadly cuneate, the apex acute or short acuminate; berries dull red. . 6—S. SMALLII

f. Leaves of an ovate, elliptic, oblong, or suborbicular type; the margin smooth or roughened (use 10X lens); the base rounded to cordate or hastate, rarely abruptly narrowed; the apex notched, mucronulate, cuspidate, acute or obtuse; berries red or black (or bluish black when glaucous). . . . . g

g. Leaves often somewhat hastate, sometimes oblong, conspicuously veined on underside and usually above, with a series of lateral veins which at their extremities are parallel to and within 0.5 mm of margin, the thin margin sometimes inrolled and simulating a marginal rib; petioles of leaves subtending fruits 8 mm long or less; branchlets usually prominently zigzag; berries black. . . . . 7—S. AURICULATA

g. Leaves ovate to ovate-oblong or suborbicular, veins on underside conspicuous or not, without veins parallel to and within 0.5 mm of margin; petioles of leaves subtending fruits over 8 mm long; branchlets usually not zigzag; berries red, black, or bluish black. . . h
h. Berries black (bluish-black when glaucous); principal stems and main branches with stout flattened prickles; leafblades usually ovate; moist or more often dry habitats. . . . 8—S. ROTUNDIFOLIA
h. Berries bright red; stems prickly mostly at the base, the prickles mostly subulate; leaf blades usually ovate-lanceolate; wet habitats.
. . . . . 9—S. WALTERI

1. SMILAX PUMILA Walt. SARSAPARILLA-VINE

Flowering in late summer and fall, the fruit ripening the next spring and often persisting. (—)

2. SMILAX LAURIFOLIA L. BAMBOO-VINE

An extremely vigorous species with dead as well as live stems often forming impenetrable entanglements. Sometimes confused with *S. smallii* which is also evergreen. In *S. laurifolia* the apex of all but the narrowest leaves is coarsely mucronate and there is a prominent and evenly submarginal vein (more conspicuous when the leaves are dried). In *S. smallii* the apex is acute to shortly acuminate and there is no evenly submarginal vein. In dried leaves of both species the rolled margins may appear like marginal veins or ribs. In *S. laurifolia* the leaf margins are often rolled down in a manner such that there appear to be two closely parallel veins at the margin and in some instances rolled to the extent that there appears to be only one marginal vein (or rib). The leaves are sometimes glaucous beneath. Tex, Okla. (—)

3. SMILAX GLAUCA Walt. SAWBRIER

Plants of this species are often easily recognized in the winter from a distance. Some leaves usually persist, retain their glaucous character beneath, and often turn reddish to purple above. Leaves of specimens that have lost their glaucous character during drying are similar to those of *S. rotundifolia*. In the latter species, however, the internodes of the smallest stems are 4-ridged or 4-angled (and thus quadrangular in cross section) whereas those of *S. glauca* usually are not. In addition, the spines of *S. glauca* are more narrowly longitudinal at their bases. When specimens are sterile and do not include spines on the smallest stems positive identification may not be possible.

Plants with the underside of leaf glabrous (under 10X lens) have been designated as var. *leurophylla* Blake [F, G]. In var. *glauca* the underside

of leaf is covered with minute hairs. Intergradation is such that these taxa do not seem separable. All adjacent states. (28, 32)

4. SMILAX BONA-NOX L. CATBRIER

A scurfy lower portion of the stem is a characteristic feature of this species. This character and the marginal rib, (which is more distinct from the underside of the leaf and when the leaf is dried) help distinguish this species from the sometimes closely similar individuals of other species, especially *S. rotundifolia* and *S. tamnoides*. In dried specimens of these two species the thin leaf margins are sometimes rolled and appear like the marginal ribs on leaves of *S. bona-nox*, *S. rotundifolia* and *S. bona-nox* may often be separated by their fruits, those of the latter usually being 1-seeded and of the former usually 2—3-seeded. *S. tamnoides* may be separated from *S. bona-nox* by the several to many ridges on the stem, the latter having only four ridges. For separating *S. bona-nox* from individuals of *S. auriculata* having similar leaf forms see discussion under the latter species (No. 7). Most of the forms of *S. bona-nox* which are similar to those of the other species are from the Coastal Plain, from Ga to Miss, and in Ark.

Four weakly delimited varieties have been indicated for our area by Fernald. In var. *hederaefolia* (Beyrich) Fern. the leaf blades on fertile branches are green to rarely mottled and cordate-ovate to deltoid-ovate to shallowly panduriform with the margins having few to no cilia. The other varieties [*bona-nox*, *hastata* (Willd.) A. DC., and *exauriculata* Fern.] are characterized by having deltoid to panduriform to narrowly lanceolate blades which have bristly-ciliate margins and are usually mottled with light green. Intergradation is so great that none of the varieties suggested for this species seems tenable. Tex, Okla, Mo, Ill, Ind, O. (32)

5. SMILAX TAMNOIDES L. BRISTLY GREENBRIER

Upon drying, the leaves of this species usually turn light olive-grey in color, whereas those of other species rarely do. Specimens having fiddle-shaped leaves, or nearly so, have often been confused with *S. bona-nox* but lack the marginal ribs on the leaves. The several to many ridges on the stem also serve to distinguish *S. tamnoides*. This latter character is especially useful in separating those forms of *S. rotundifolia* having similar leaf shapes (the latter having only 4 ridges on the stem).

Plants with leaves ovate, elliptic, or nearly orbicular have been designated as var. *hispida* (Muhl.) Fern. [F]. Var *tamnoides*, which is more common in the Coastal Plain, has some or all of the leaves fiddle-shaped. The leaf forms of these varieties intergrade and their distributions overlap. The manner of separation of these two varieties is not clear to me; further study may show that these varieties cannot be maintained. *S. hispida* Muhl. [S]. All adjacent states. (—)

6. SMILAX SMALLII Morong. LANCELEAF GREENBRIER

Leaves are sometimes similar to those of *S. laurifolia* but are thinner. Other distinguishing characters are discussed under the latter species (No. 2). The leaf margins are sometimes rolled down on the underside in dry material and appear much like those forms of *S. bona-nox* having fine marginal ribs. Some forms of *S. smallii* and *S. auriculata* are similar but the latter has a series (rarely only two) of lateral veins which at their extremities are parallel to and within 0.5 mm of the margin of the leaf. Material of this species is frequently used for decoration. *S. lanceolata* L. [S]. Tex, Okla. (—)

7. SMILAX AURICULATA Walt. WILD-BAMBOO

Leaves are usually narrow, sometimes quite narrow, but they may be to 10 cm. wide. On narrow leaves the submarginal veins and the inrolled margin are sometimes so close that along most of the margin they appear as a single rib with a shallow narrow groove. Some individuals of this species are similar to forms of *S. bona-nox* and *S. tamnoides* but are readily separated by having shorter peduncle length and submarginal veins. Forms in southern Fla have a thickened leaf margin or sometimes a rib which may be separated from the submarginal veins only by a groove. These forms intergrade (in Dade, Monroe, and Lee Cos) with *S. havanensis* Jacq. whose leaves have a strong marginal rib which may or may not have spines. Some forms of *S. auriculata* and *S. havanensis* have been unjustifiably assigned to *S. beyrichii* Kunth in the past. SE only. (—)

8. SMILAX ROTUNDIFOLIA L. COMMON GREENBRIER

Various forms of this species have been confused with plants of several other species. The thin leaf margin may be rolled or not. In either case the leaves may be confused with those of *S. tamnoides* (which see for distinguishing characteristics). When the margin is rolled specimens have often been mistaken for *S. bona-nox*. Careful study under at least 10X magnification is suggested in order to distinguish between a true rib and one simulated by the rolling of the thin leaf margin in *S. rotundifolia*.

In the past, forms with four-angled stems have been designated as var. *quadrangulata* (Muhl.) Wood, but I agree with Fernald, Gleason, and others in not recognizing the variety; the smallest stems on almost all plants are quadrangular and there is a complete series of four-angled forms from the least to the most distinctly so. All adjacent states. (32)

9. SMILAX WALTERI Pursh CORAL GREENBRIER

This species is easily separated from the somewhat similar *S. rotundifolia* by a usually different leaf shape and by bright red fruits which are persistent over the winter. Those plants with similar leaf forms are otherwise difficult to separate. When the leaves of *S. walteri* are dried they usually turn to a very lightly orange tinged brown, unlike the color of dried leaves of any other species. Tex, NJ. (—)

ARISTOLOCHIACEAE **BIRTHWORT FAMILY**

Woody vines or low perennial herbs.

2174. ARISTOLOCHIA L.

Underside of leaf blades and young stems soft-hairy; calyx yellowish, pubescent; peduncles bractless. . . . . 1—A. TOMENTOSA

Underside of leaf blades and young stems glabrous or minutely pubescent; calyx purple, glabrous; peduncles bearing a rounded cordate bract. . . . . 2—A. MACROPHYLLA

1. ARISTOLOCHIA TOMENTOSA Sims PIPE VINE

The fruits of this and the following species resemble those of *Yucca*, being a 6-ridged capsule and containing flat seeds arranged in tiers. Escaped from cultivation beyond its natural range. Tex, Okla, Mo, Ill, Ind. (—)

2. ARISTOLOCHIA MACROPHYLLA Lam. DUTCHMAN'S PIPE

Escaped from cultivation beyond its natural range. *A. durior* Hill [F, G, GC, R, SC]. Pa. (28)

POLYGONACEAE **BUCKWHEAT FAMILY**

Trees, shrubs, woody vines, or herbs.

2206. BRUNNICHIA Banks

BRUNNICHIA CIRRHOSA Gaertn. LADIES' EARDROPS

The common name is derived from the appearance of the winged fruits. Tex, Okla, Mo, Ill. (48)

RANUNCULACEAE **CROWFOOT FAMILY**

Shrubs, woody vines, or herbs.

2542. CLEMATIS L.

CLEMATIS VIRGINIANA L. VIRGIN'S-BOWER, CLEMATIS

The white flowers, usually abundant, are conspicuous even at a distance. Stems are susceptible to winter kill. However, at Athens, Ga, stems survived to 2.5 m above ground with temperature down to 1° F. In the Blue Ridge Province of Va a stem several years old was seen 13 feet above ground (Duncan 22855, ca 2700 feet elevation, Floyd Co). These stems may have survived even colder temperatures. Okla, Mo, Ill, Ind, O, Pa, NJ. (16)

LARDIZABALACEAE **LARDIZABALA FAMILY**

Represented in our flora by a woody vine only.

2555. AKEBIA Dcne.

AKEBIA QUINATA (Houtt.) Dcne. AKEBIA

Rare escape from cultivation, in Madison and Orange Cos, NC only. Native of E Asia. Perhaps escaped in adjacent states. (32)

MENISPERMACEAE **MOONSEED FAMILY**

Woody vines.

2567. MENISPERMUM L.

MENISPERMUM CANADENSE L. MOONSEED

Sometimes the petiole may be attached less than one mm inside the edge of the leaf blade and sterile herbarium specimens therefore are sometimes difficult to distinguish from those of *Cocculus*. Only very rarely are the petioles so near the margin on all the leaves of an entire plant. The stone of fruit is flattened on both sides, roughened and grooved, and crescent shaped. Apparently always twines from left to right. All adjacent states. (52)

2570. COCCULUS DC.

COCCULUS CAROLINUS (L.) DC. CAROLINA MOONSEED, CORALBEADS

The bright red fruits are very showy in late summer and fall. The stones, which are flattened on both sides, are shaped somewhat like a snail shell. *Epibaterium carolinum* (L.) Britt. [S]. Tex, Okla, Mo, Ill, Ind. (78)

2599. CALYCOCARPUM Nutt.

CALYCOCARPON LYONII (Pursh) Nutt. CUP-SEED

Stone of fruit hollowed out on one side, making a cup-like depression, its margin roughly ridged. The lack of petals will also serve to separate this species from the sometimes vegetatively similar *Menispermum canadense*. Okla, Mo, Ill, Ind. (—)

SCHISANDRACEAE **SCHISANDRA FAMILY**

Woody vines.

2656. SCHISANDRA Michx.

SCHISANDRA GLABRA (Brick.) Rehd. WILD SARSAPARILLA

Rare but perhaps more common than records indicate. Individual leaves, although alternate, resemble those of the common *Decumaria* and, therefore, may be overlooked. *S. coccinea* Michx. [S]. SE only. (26)

SAXIFRAGACEAE **SAXIFRAGE FAMILY**

Shrubs, woody vines, or herbs.

3222. DECUMARIA L.

DECUMARIA BARBARA L. CLIMBING HYDRANGEA

Trailing as well as climbing. Flowers fragrant, in conspicuous white clusters. SE only. (—)

LEGUMINOSAE **LEGUME FAMILY**

Two genera are woody vines. The other taxa are trees, shrubs, or herbs.

3722. WISTERIA Nutt.

a. Ovary and pod glabrous; leaflets on largest leaves 15 or fewer; calyx tube at anthesis usually longer than wide; auricle of wing-petals linear and nearly parallel to claw. . . . . b

b. Largest leaflets 4-6 cm long, oblong to narrowly elliptic or narrowly ovate, their length-width ratio over 2.2; racemes 4-12 cm long; pedicels and calyx with no to a few (rarely many) stalked glands; auricles of wing-petals shorter than the claw.
. . . . . 1—W. FRUTESCENS

b. Largest leaflets 5-8 cm long, sometimes smaller in adverse habitats, ovate to elliptic, their length-width ratio under 2.2; racemes 15-30 cm long; pedicels and calyx usually with abundant stalked glands; auricles of wing-petals about as long as the claw.
. . . . . 2—W. MACROSTACHYA

a. Ovary and pod velvety pubescent; leaflets on largest leaves 7-19; calyx tube at anthesis about as wide as or wider than long; auricle of wing-petals narrowly triangular and divergent 50° or more from the claw. c

c. Leaflets of largest leaves 13-19; flowers gradually opening from base to apex of raceme, the largest racemes 20-50 cm long and 5-7 cm wide; calyx sparsely pubescent outside, broadly cup-shaped, broader than long. . . . . 3—W. FLORIBUNDA

c. Leaflets of largest leaves 7-13; flowers opening nearly simultaneously, the largest racemes 15-20 cm long and 8-10 cm wide; calyx densely pubescent outside, campanulate, the tube about as broad as long. . . . . 4—W. SINENSIS

1. WISTERIA FRUTESCENS (L.) Poir. WISTERIA

This species seems distinct from the next over large areas but the two intergrade locally and in the western part of our area. Intergradation seems to have been mostly promoted by frequent use of these species as ornamentals. Treating the two taxa as varieties does not seem justified by my studies to date. Additional studies of the populations are especially needed west of the Mississippi River. Such studies may indicate a varietal status for the two taxa whereas it is not indicated for the populations to the east. *Kraunhia frutescens* (L.) Britt. [S]. Tex. (16)

2. WISTERIA MACROSTACHYA Nutt. WISTERIA

Apparently favored over the above species for planting because of its longer racemes. It has escaped and hybridized with *W. frutescens*. See discussion above. *Kraunhia macrostachya* (Nutt.) Small [S]. Tex, Okla, Mo, Ill, Ind, O. (16)

3. WISTERIA FLORIBUNDA (Willd.) DC. JAPANESE WISTERIA

Native of Asia. Cultivated and escaped. *Kraunhia floribunda* (Willd.) Taub. [S]. Tex. (16, 24)

4. WISTERIA SINENSIS Sweet CHINESE WISTERIA

Native of Asia. Cultivated and frequently escaped. SE only. (16)

3889. PUERARIA DC.

PUERARIA LOBATA (Willd.) Ohwi KUDZU-VINE

Flowering abundantly but fruiting infrequently. Leaves and younger

stems highly sensitive to frost but older stems, sometimes those high in trees, resistant to the coldest winters in the southern states. Introduced from E Asia and now abundantly naturalized. Often used for erosion control but now mostly detested. Climbing to the tops of tallest trees and often destroying forest areas. *P. thunbergiana* (S. & Z.) Benth. [S]. Tex, Mo, Ill, O. (22, 24)

ANACARDIACEAE — SUMAC FAMILY

Trees, shrubs, or woody vines.

4594. TOXICODENDRON [Tourn.] Mill.

TOXICODENDRON RADICANS (L.) Kuntze — POISON IVY

Main stem to 10 cm diameter. A rare form of this species has five leaflets. Also grows as a low, slender, unbranched to weakly branched shrub. Many persons are highly allergic to contact with any part of plants of this species. Repeated washings with abundant use of soap followed by rinsings are strongly recommended as a preventive measure if one suspects, or has had, contact with any part of a plant. *Rhus radicans L.* [F, G. GC, R, SC]. All adjacent states. (30)

CELASTRACEAE — STAFFTREE FAMILY

Trees, shrubs, or woody vines.

4625. CELASTRUS L.

CELASTRUS SCANDENS L. — BITTERSWEET

The globose fruits when ripe are orange and split open into 3 valves exposing the fleshy scarlet coverings around the seeds. Fruiting branches, stripped of leaves, are often used for interior decoration. A specimen collected by T. G. Harbison and reported to be from White Sulphur Springs, Meriwether Co., Ga. is undoubtedly from Greenbrier Co., W. Va. I have seen a collection of *Acer pennsylvanicum* by Harbison from White Sulphur Springs, W. Va. made only one day earlier. The label is in Harbison's own handwriting. It would seem that the *Celastrus scandens* was mislabeled, especially since the Georgia locality in question is south of the expected range of the species. All adjacent states. (46)

RHAMNACEAE — BUCKTHORN FAMILY

Trees, shrubs, or woody vines.

4868. BERCHEMIA Neck.

BERCHEMIA SCANDENS (Hill) K. Koch — RATTAN-VINE, SUPPLE-JACK

Main stems have been seen as large as a diameter of 18 cm. *B. scandens* (Hill) Trelease [S]. Tex, Okla, Mo, Ill. (—)

VITACEAE — GRAPE FAMILY

Most individuals are woody vines. Some are fleshy vines or shrubby. Four genera have species which are woody vines.

4909. VITIS L.

Since grapes have some plants with staminate flowers only, a practical taxonomic treatment should utilize vegetative characters in so far as possible. From the discussion below it should become evident that for other reasons also it is necessary to rely heavily on vegetative characters.

In the early years of my observations on grapes, fruit size seemed to be a very useful character. The closely related *V. rotundifolia* and *V. munsoniana* were traditionally separated mostly on fruit size. Also, of the remaining species it seemed that there were species whose fruits were large *(V. labrusca, V. mustangensis, V. shuttleworthii)*, that those of *V. aestivalis* were medium-sized, and that still others were relatively small *(V. cinerea, V. vulpina, V. riparia, V. rupestris, V. palmata)*, although within the groups fruit size had practically no diagnostic value. Subsequent field and herbarium studies showed that the fruits did not serve to separate the first two species and that there was considerable overlap between the "medium-sized" fruits of *V. aestivalis* and certain species in both the large and small fruited groups. Presently, fruit size seems to be of relatively little value since the large-fruited species can readily be recognized by the nature of the vestures on the lower leaf surface.

Other fruit characters are also of limited value in separating closely related species. However, in *V. riparia* the fruits are generally glaucous while in the related *V. vulpina* and *V. palmata* they generally are not. Also on plants in the same region the fruits of the former usually ripen before those of *V. vulpina* while those of *V. palmata* usually ripen later than either of the other two species. In addition, the shape and surface features of the seeds may be different in *V. vulpina* from those in *V. riparia*. The same general problems are often involved in respect to fruit flavor and texture of most species of grapes. Further study is needed to establish the reliability of each of the above characters over the entire ranges of the species.

The usefulness of inflorescence length is essentially limited to separation of the taxa into two artificial groups. Inflorescences are relatively short in some species *(V. rotundifolia, V. mustangensis, V. labrusca*, and *V. shuttleworthii)* and considerably longer in all other species except *V. rupestris* in which they are generally only slightly longer. The number and density of fruits in the inflorescences of otherwise closely similar species are usually not correlated with other characters. At least one exception occurs in those elements of *V. vulpina* that have permanently hairy leaf undersurfaces. Such individuals usually occur in the Coastal Plain and most often have more numerous and crowded fruits than the more glabrous forms of any area.

In my studies of vegetative characters it soon became evident that the

interpretation of some species as presented by current manuals needed modification. Not only was there some disagreement among current authors concerning characteristics of certain taxa but as data from increasing numbers of specimens became available it was seen that intergradation of certain characters was such that some taxa probably should not be maintained at any level. A notable example existed in the case of *V. baileyana*. The characters attributed to this species by S, F, G, and others fail to correlate so frequently and intergrade so abundantly in a continuous series with characters of *V. vulpina* that only one taxon is justified. Combining the individuals of these species into one taxon, *V. vulpina*, means that the leaves of this species vary from glabrous to short hairy and/or sometimes cobwebby.

V. cinerea var. *floridana* also has been variously delimited. In any combination, however, many of the characters intergrade abundantly with those of the new *V. vulpina* (above), especially in the Coastal Plain from Va to Ala. Therefore, I have concluded that many specimens that have been labeled as this variety of *V. cinerea* are part of a highly variable *V. vulpina*, and that some are parts of the variable *V. aestivalis* and *V. cinerea*. In *V. vulpina* the number of individuals with abundant short spreading and/or cobwebby hairs in general increases southwardly; the same is true for *V. aestivalis*. For example, to the north, especially beyond our range, and south in the Blue Ridge into Ala many individuals, and in some places all, have glabrous leaves, whereas with increasing distances from these areas the density of cobwebby hairs on plants in general increases until leaves and stems are often heavily beset with them. Plants with abundant cobwebby hairs are most frequent in the southern part of the Coastal Plain. In *V. aestivalis* the cobwebby hairs are much more abundant than in *V. vulpina*. The reverse is true of the short spreading hairs. These short hairs may predominate, especially in *V. vulpina*, or may be accompanied by the cobwebby hairs which sometimes obscure them. Some of these hairy forms of *V. aestivalis* are the *V. simpsonii* and *V. rufotomentosa* as treated by Small. Fernald and Gleason interpreted *V. simpsonii* as being *V. cinerea* var. *floridana*. However, intergradation of *V. simpsonii* and *V. rufotomentosa* with *V. aestivalis* of the older sense is continuous and complete. It is important here to note that the "straight" hairs of *V. aestivalis* (of my interpretation) are longer and usually more rusty or reddish than in *V. cinerea*. The hairs are usually greyish or ashy in the latter species.

Recently I have decided that *V. lincecumii* is not taxonomically distinct from *V. aestivalis*. None of the characters used diagnostically by various authors seems reliable. However, those populations formerly designated as *V. lincecumii*, which are largely west of the Mississippi River, generally have leaves that are less whitened beneath, i.e., there

are fewer plants with heavily glaucous leaves and more plants with leaves merely light green beneath.

Combining the various taxa as indicated above reduces to ten the number of species in our area. As may be deducted from the presentation to follow, further combinations may need to be made, but if so, probably only to the subspecies or varietal level. Although some of the ten species as treated here do intergrade, the numbers of intermediate individuals are relatively small and are sometimes apparently absent over large areas. Additional information concerning the species and their relationships should be helpful in understanding species variability, in use of the key to follow, and in placing plants in the appropriate species, and is presented below.

V. labrusca and *V. shuttleworthii* are closely related, having several similar characteristics including that of the vesture on the leaf. The felty hairs of these species lie very close to the lower leaf surface. These hairs may have some relation to those of *V. mustangensis* or densely cobwebby ones of forms of *V. aestivalis*, many of which have been misnamed as *V. labrusca*. The vesture types of *V. mustangensis* and *V. aestivalis*, however, are distinguishable in that the cobwebby hairs extend farther from and do not lie as close to the leaf surface. The types of vestures on *V. mustangensis* also are quite similar to those on some forms of *V. cinerea*. Nevertheless, individuals of the two species are usually readily distinguishable, the cobwebby hairs in the former consisting of a felty mat and in the latter being distinctly less abundant. A few intermediates indicate natural hybridization occurs between these two species.

Intergradation between *V. cinerea*, *V. aestivalis*, and *V. vulpina* is probably more abundant than between other species combinations. The most important situations seems to be as follows. Some individuals of the latter two species have spreading hairs characteristic of *V. cinerea*. Cobwebby hairs of forms of *V. cinerea* and/or of *V. aestivalis* sometimes occur on leaves of *V. vulpina*, and the types of hairs on *V. cinerea* and *V. aestivalis* occasionally intergrade. Individuals of *V. vulpina* that seem to be influenced by hybridization with the other two species usually exhibit larger leaves with broader shoulders in addition to a greater abundance of cobwebby hairs. Intergradation involving *V. cinerea* and *V. vulpina* most often occurs in Ky, W Tenn, or Ala and westward while that involving *V. aestivalis* and *V. vulpina* is most abundant in the southern part of the Piedmont, and in the Coastal Plain from SC to Fla, and in Ark. In spite of similarities between some individuals of these three species and the occurrence of intermediates the combination of short spreading hairs on the leaves, petioles, and stems of the current year serve to identify individuals of *V. cinerea* while the light colored to heavily glaucous surface (hair color is excluded) of the

underside of the leaves and often more lobing serve to distinguish *V. aestivalis* from *V. vulpina* whose leaf blades are greenish beneath. The younger leaves may cause confusion because some maturation is required before the light (or glaucous) surface is clearly evident, especially in dried specimens.

The type of loose cobwebby hairs that is characteristic of the lower and sometimes upper sides of the leaves of *V. mustangensis* is occasionally found on leaves of *V. cinerea*, more frequently west of the Mississippi River but occasionally eastward to central Tenn. This type of hair is also found on some leaves of *V. aestivalis* west of the Mississippi River and eastward in the lower Coastal Plain into eastern Fla.

V. vulpina, *V. riparia*, *V. palmata*, and *V. rupestris*, all of which have leaf blades greenish beneath, form a natural group. The lateral lobes of the leaves generally are the most prominent in *V. palmata* and least prominent (and sometimes absent) in *V. vulpina* and *V. rupestris*. Leaf blades of all four species generally average less in width than blades of plants in sympatric populations of *V. cinerea* and *V. aestivalis*.

Increased lobing of leaves is apparently associated with certain environmental situations and specimens consisting of a stem and a few leaves may be atypical of the species. Sprouts arising after earlier growth has been cut down (such as by mowing and cutting along highway rights of way) generally have leaves that are more prominently lobed. This same situation may occur after fire has killed or damaged the earlier growth. Under such circumstances leaves of *V. vulpina* which ordinarily are often unlobed are shaped like small editions of lobed forms of *V. aestivalis* or *V. palmata*. Leaves produced later in the growing season often have more prominently lobed leaves anyhow, but the differences are generally not as great as under the above circumstances. Lobing of the leaves, however, may be quite characteristic of many populations. In some, especially in southern Coastal Palin populations of *V. aestivalis* and *V. shuttleworthii*, the leaves are always lobed and sometimes deeply so.

Caution should be taken in respect to the interpretation of the extent of hairiness of *Vitis* plants. Hairs present on young parts may later fall off and so the time of year that the collection was made or the plant is being observed should be considered. Sometimes the first nodes and internodes may be hairy, even permanently so, and yet the upper nodes and more often the internodes are glabrous or eventually become so. Therefore, the part of the plant which is being observed should be considered.

Studies of grapes from the horticultural viewpoint may have contributed considerably to the recognition of the many species and varieties which appeared in literature in the past. In more recent manuals some of the taxa have been combined, apparently on the basis of studies

of greater numbers of specimens. On the basis of specimens seen from over 36 herbaria, I have decided that further combinations are needed and am reducing the number of species in the southeast to ten. It also seems that none of the commonly recognized varieties should be maintained. Additional studies are needed to learn whether or not all ten species should be maintained at that level. Some of the problems involved will be evident in the treatment to follow.

KEY TO SPECIES OF VITIS

a. Bark not shredding; lenticels evident on older stems; tendrils simple; pith without diaphragms at the nodes; berries 10-25 mm in diam, in globular or slightly elongate bunches; fully expanded leaves dentate, unlobed to shallowly lobed, glabrous beneath except axils of veins and sometimes on the veins. . . . 1—V. ROTUNDIFOLIA

a. Bark on the older stems shredding; lenticels inconspicuous or absent; tendrils usually forking; pith with diaphragms at the nodes; berries 3-25 mm in diam, usually in elongated bunches; fully expanded leaves dentate to serrate, scarcely to deeply lobed, glabrous to quite hairy beneath. . . . . b

b. Underside of fully expanded leaves felty with densely and evenly matted white, ashy grey, tawny, or rusty cobwebby hairs, these hairs *evenly* distributed and concealing the surface but not always the larger veins, very small parts of the leaf surface sometimes being visible under 10X magnification. c

c. Underside of leaves with short spreading hairs hidden beneath a very closely adhering mat of cobwebby hairs which may be separated with a needle from the shorter straight hairs, all hairs being light grey, La and Ala. 4—V. MUSTANGENSIS

c. Underside of leaves with no short spreading hairs or such hairs not hidden beneath the mat of cobwebby hairs which adhere tightly to the leaf surface, hairs white to rusty-colored. . d

d. A tendril and/or inflorescence at each of 3 or more consecutive nodes; the hairs on the underside of leaves tawny to reddish. . . . . 2—V. LABRUSCA

d. A tendril and/or inflorescence at no more than 2 consecutive nodes; the hairs on the underside of leaves white to reddish. . . . . 3—V. SHUTTLEWORTHII

b. Underside of fully expanded leaves not felty, but glabrous or with short spreading or cobwebby hairs or both, the hairs not concealing the surface (sometimes densely cobwebby but then the surface of the hair-mass uneven and small areas of the leaf surface visible through "windows" in the matted hairs). . . . . e

e. STEMS of current year, PETIOLES, and UNDERSIDE OF LEAVES with light-colored (sometimes tawny-) short spread-

ing hairs, the longest on the petioles and underside of leaves being about 0.20 mm long. . . . . 6—V. CINEREA

e. STEMS of current year usually lacking short spreading hairs (sometimes the nodes and the basal few internodes with short spreading hairs), PETIOLES usually without short spreading hairs (the hairs, if present, from about 0.20 to 0.35 mm long), UNDERSIDE OF LEAVES glabrous or with short spreading hairs to 0.35 mm long. The few hairy forms of *V. vulpina* which may not be readily separated from *V. cinerea* by the above characters may be distinguished by their smaller leaves with less prominent (or no) shoulders. . . . . f

f. Underside of fully expanded leaves not greenish, the surface either glaucous (and then glabrous or hairy) or light-colored and bearing light to rusty-colored cobwebby hairs—or sometimes also with short spreading light- to rusty-colored hairs); usually some or all leaves lobed and with rounded sinuses; young stems, petioles, and peduncles glabrous or often with cobwebby hairs, or less frequently with straight hairs or both; the older stems of the current year rarely with the nodes or the basal few internodes bearing short straight hairs. . . . . 5—V. AESTIVALIS

f. Underside of fully expanded leaves greenish (never glaucous) and glabrous except in axils of main veins, or sometimes with scattered cobwebby hairs and/or short spreading hairs (in forms of *V. vulpina);* leaves usually unlobed or if lobed the base of the sinus angled, usually acute, or rarely rounded in sprouts after cutting or burning; young stems, petioles, and peduncles glabrous (in forms of *V. vulpina* with short spreading hairs and/or occasionally with thin cobwebby hairs). . . . . g

g. Leaves usually broader than long, when fully expanded mostly 3-10 cm long and 4-12 cm wide; peduncles 7-20 mm long, not bearing a tendril; the bark tardily exfoliating; mostly prostrate, or trailing or rarely climbing; tendrils often scarce (sometimes absent).
. . . . . 8—V. RUPESTRIS

g. Leaves usually longer than broad, when fully expanded mostly 5-20 cm long and 6-18 cm wide; peduncles 15-80 mm long, often bearing a tendril which often falls easily but leaves a scar; the bark usually exfoliating by the end of the second year; plants high climbing; tendrils usually several to many. . . . . h

h. Leaves unlobed or with short-pointed or shoulder-like lateral lobes that are sometimes stubbily falcate,

the margins usually not ciliolate, most or all serrations obtuse as determined by straight lines from the sinuses to the outward edge of the serration but omitting any cusp present; in many forms the underside of the leaves with short straight hairs and/or rarely cobwebby ones; diaphragm of pith usually 2-6 mm long; fruit black, usually not glaucous.
. . . . . 7—V. VULPINA

h. Leaves usually with two tapering lateral lobes that are erect to slightly divergent, the leaf margins ciliolate or eciliolate, most or all serrations acute; leaves rarely hairy beneath; diaphragm of pith 0.8-5 mm long; fruit black and not glaucous, or heavily glaucous. i

i. Branches of current season green, gray, or brown after leaves are mature; diaphragm of pith 0.8-2 mm long; mature leaves firmly membranaceous, the margins ciliolate, the tip acute to short-acuminate; fruit black to deep purple under a glaucous surface. . . . . 9—V. RIPARIA

i. Branches of current season bright red or purplish-red after leaves are mature; diaphragm of pith 2-5 mm long; mature leaves thin, the margins eciliolate or nearly so, the tip long acuminate to tapered; fruit black, not glaucous
. . . . . 10—V. PALMATA

1. VITIS ROTUNDIFOLIA Michx.
MUSCADINE, SCUPPERNONG, BULLACE GRAPE

Leaf blades vary from kidney-shaped to cordate-deltoid and the tip rounded to acuminate. Forms occurring in the scrub vegetation of central Fla have largest leaves only 3 cm wide. Fruits are variable in size (1-2.5 cm), texture of skin and flavor. Plants with the smaller fruits, more tender skin, and acid pulp are frequent in peninsular Fla and have been segregated as *V. munsoniana* Simpson but seem not taxonomically distinct. At the very most the two might be varieties. Two types of domestic grapes originated from this species. Those with amber-green fruits are known as Scuppernongs while those with purple fruits are Muscadines. Both wild and domestic forms frequently send out drooping aerial roots from the stems, a character that seems peculiar to this species of grape. *Muscadinia rotundifolia* (Michx.) Small [S]. *Muscadinia munsoniana* (Simpson) Small [S]. Tex, Okla, Mo. (40)

2. VITIS LABRUSCA L. FOX OR PLUM GRAPE

Strains of the cultivated *V. labruscana* Bailey have occasionally escaped, sometimes in areas where *V. labrusca* is not native. However,

since these cultivated strains originated from the latter, they are being treated here under *V. labrusca*. The berries are usually from 15-25 mm in diameter. This species is closely related to *V. shuttleworthii* which occurs only in Fla. Cobwebby forms of *V. aestivalis* have frequently been confused with *V. labrusca*. Some specimens with young leaves are especially hard to place. On older leaves of the latter, however, the felty hairs are evenly and tightly adhered to the under leaf surface, whereas in *V. aestivalis* some portions of the cobwebby hairs are in irregular masses slightly raised above the leaf surface. Mo, Ill, Ind, O, Pa, NJ. (38)

3. VITIS SHUTTLEWORTHII House — UPLAND GRAPE

Much like the preceding species but the hairs on the underside of the leaf blades may vary from white to rusty-colored, especially when young. Leaves with white hairs sometimes occur on the same plant with leaves having rusty hairs. The blades may be unlobed to deeply 5-lobed. The berries are 15 mm in diam or less, and variable in size. Small may have considered rusty-colored forms as part of *V. simpsonii* Munson. *V. coriacea* Shuttlew. Fla only. (—)

4. VITIS MUSTANGENSIS Buckl. — MUSTANG GRAPE

The leaves are sometimes deeply lobed as they are in *V. shuttleworthii*. The hairs on the underside of the leaves are always light in color. The cobwebby hairs on the stems are mostly longitudinally oriented. This species may be related to both *V. labrusca* and *V. cinerea*. In some forms of the latter the character of the vesture is much like that of *V. mustangensis* but less dense. These two species are also readily distinguished in that the leaf serrations on larger leaves in the latter are wider apart (ca 10 mm) than in *V. cinerea* (ca 5 mm). *V. candicans* Engelm. Tex, Okla. (38)

5. VITIS AESTIVALIS Michx. — SUMMER OR PIGEON GRAPE

A quite variable and widely distributed species. The undersurface of the leaf is pale or glaucous though sometimes almost hidden by hairs. The light color is sometimes faint on young leaves, particularly in dried specimens. The petioles and first year stems as well as the underside of the leaves are sometimes cobwebby, especially in Fla and the lower Atlantic Coastal Plain. The hairs are quite rusty in "scrub" habitats. In "scrub" areas of central Fla the largest leaves may not exceed 4 cm in width. The petioles and veins on the underside of the leaves sometimes have a few to rarely many short spreading hairs (such plants may also have cobwebby hairs). These spreading hairs are usually longer than those of *V. cinerea*, the longest being about 0.35 mm long in the former and 0.20 in the latter. Where the two taxa are sympatric the leaves of *V. aestivalis* are usually the larger. Some forms are much like *V. cinerea* except that the stems lack short spreading hairs. Sometimes the first few nodes and internodes may have spreading hairs. Forms with no

spreading hairs on any part of the plant to those forms with many such hairs on one or more parts sometimes occur in the same populations.

In *V. aestivalis* all types of hairs tend to be less rusty-colored and are more often grey in the western part of our area as compared to the eastern. The percentage of plants with rusty-colored hairs and the color-intensity and density of these hairs increase into the southeastern-most part of our area. Plants having reddish to rusty cobwebby hairs and few to no spreading hairs on the underside of the leaf are widely distributed and have been treated as var. *aestivalis* [F]. These are the most abundant in the Lower Coastal Plain and especially in peninsular Fla. Those plants with the hairs mostly or entirely early deciduous or absent have been known as var. *argentifolia* (Munson) Fern. [F, G, GC, R] or *V. bicolor* LeConte [S]. These are the most abundant in the Blue Ridge and other mountains to the west and north of our area. Plants from La to Fla with permanently hairy twigs and petioles have been separated as *V. rufotomentosa* Small [S] and those with dense rusty tomentum on the leaves as *V. simpsonii* Munson [S]. Varied combinations of characters have been used to separate *V. lincecumii* Buckl. [F, G, S] but largely on the basis of bigger berries and a more cobwebby underside of the leaf blade. As is partly indicated in the introductory discussion on *Vitis* the characters used to separate the above taxa intergrade abundantly and in varying combinations. From the data presently available it seems that none of them should have separate status. However, there is justification for extensive studies designed to determine whether or not any of those formerly treated as species should be recognized at the subspecific level. Studies are also necessary to determine more clearly the relationships existing between *V. aestivalis, V. cinerea,* and *V. vulpina* which intergrade and apparently hybridize. All adjacent states. (38)

6. VITIS CINEREA Engelm. DOWNY OR SWEET WINTER GRAPE

The hairs on plants of this species are usually light-colored but occasionally vary to rufescent. Var. *floridana* Munson [F, G, GC] (*V. simpsonii* Munson as interpreted by F and G, but not S) has been separated as having rufescent or rusty hairs, but intergradation of color and other characters is such that this variety should not be maintained. Specimens previously assigned to this variety and from Fla and Ga to Va are usually forms of *V. vulpina* while those from Miss and W Tenn and westward occasionally are forms of *V. cinerea.* Some individuals previously assigned to *V. cinerea* but not having spreading hairs on all internodes probably are forms of *V. aestivalis* or *V. vulpina,* or are introgressants or hybrids of *V. cinerea* with these species. Although *V. cinerea* intergrades with these species, the three species should be maintained. (See introduction to *Vitis* and under *V. aestivalis* for discussions of the intergradation and separation of these species.) *V. cinerea* sensu R seems to

involve some individuals of *V. aestivalis* as well. A collection of *Vitis* from Calcasieu Parish, La (Thieret 23510. Section 39. Just west of Calcasieu River. Ca 5.5 miles SE of Sulphur) is tentatively being assigned to *V. cinerea*. These plants are extremely glaucous, often chalky, with even the second year stems usually being chalky. Additional study is needed, especially of material from west of our range. *V. baileyana* Munson [SC in part]. Tex, Okla, Mo, Ill, Ind, O. (38)

7. VITIS VULPINA L. FROST GRAPE

In the Coastal Plain this species is the most frequent in lowlands but in the higher provinces it frequently inhabits upland situations. Petioles and the underside of leaves often have short spreading hairs and/or sometimes cobwebby ones. Such plants are the most abundant in the Coastal Plain, and especially in Fla and Ala and westward. Most of these plants formerly have been interpreted as being *V. cinerea* var. *floridana* or *V. baileyana*. (See the introduction to *Vitis* for discussions regarding combination of these taxa.) Some of the hairy plants formerly included in the latter two taxa are probably intergrades of *V. aestivalis* and *V. cinerea*. Forms of *V. vulpina* with glaucous fruits usually show some intergradation with *V. aestivalis* or *V. riparia*. *V. vulpina* and *V. riparia*, although usually distinct, have forms that may be confused. Ordinarily in the former the leaf blades are unlobed, or the lobes, if present, are unlike the central one, the teeth, excluding any cusp, are obtuse, and the margins usually not ciliate. The seeds of *V. vulpina* are generally longer than broad and usually acuminate, the raphe extending over the end as an elevated ridge. See *V. riparia* for contrasting characteristics. *V. vulpina* often develops deeply lobed leaves after cutting or burning of older stems. *V. cordifolia* Lam. [S]. *V. baileyana* Munson [SC in part, S, F, G, R]. All adjacent states. (38)

8. VITIS RUPESTRIS Scheele SAND OR SUGAR GRAPE

Occurs mostly in rocky situations along and in streams. This species seems related to *V. riparia*. Its often shrubby nature may be partly due to lack of something to climb on rather than to hereditary factors. Studies are needed to determine whether or not both taxa should be maintained and if so, at what level. Okla, Mo, O, Pa. (38)

9. VITIS RIPARIA Michx. RIVERSIDE GRAPE

The most frequent in the more moist habitats, as the common name implies. Separated from *V. vulpina* by having lateral lobes of leaves usually like the central one, leaf margins ciliolate, teeth of leaves acute (see couplet h in key), the seeds commonly rounded and with an obtuse apex, the raphe extending over the end only as a line. Sometimes the leaves are similar to those of *V. vulpina* in that the blades are unlobed or have lobes characteristic of that species. The unlobed leaves are often the first formed of the year, those being formed later in the year usually having the more distinctive lateral lobes. In W Va, Ky, and Ark indi-

viduals of these two species are often similar in that *V. riparia* frequently has short lateral lobes, but the ciliolate margins and acute serrations of the leaves usually identify the latter.

Some leaves of *V. riparia* are similar to those of *Ampelopsis cordata.* The latter may be identified by its having stems with a white pith while that of *Vitis* species is light brown. *V. vulpina* L. [S]. Tex, Okla, Mo, Ill, Ind, O, Pa. (38).

10. VITIS PALMATA Vahl. RED OR CAT GRAPE

This species generally is found in habitats that are more moist than those in which *V. riparia* occurs. The leaf-lobes of this species are longer and more tapered than those of the related *V. riparia.* Tex, Okla, Mo, Ill, Ind. (—)

4915. PARTHENOCISSUS Planch.

PARTHENOCISSUS QUINQUEFOLIA (L.) Planch.
VIRGINIA CREEPER, WOODBINE

Those plants with twigs, tendrils, and leaves pubescent instead of glabrous have been considered as a separate species, *P. hirsuta* (Donn.) Small [S] and a form [F, G]. All adjacent states. (40)

4916. AMPELOPSIS Michx.

a. Leaves compound. . . . . b
b. Leaves bipinnately or partially tripinnately compound; leaflets many. . . . . 1—A. ARBOREA
b. Leaves palmately compound, leaflets 3 and 5. . . . . 4—A. ACONITIFOLIA
a. Leaves simple. c
c. First year stem glabrous, leaf blades usually not lobed. . . . . 2—A. CORDATA
c. First year stem pubescent, sometimes almost glabrous near end of year, leaf blades usually lobed. . 3—A. BREVIPEDUNCULATA

1. AMPELOPSIS ARBOREA (L.) Rusby PEPPER-VINE

A collection from Cabell Co., W. Va. may be planted, for collection data report "climbing over shrubs and trees in Roland Park." Tex, Okla., Mo, Ill. (40)

2. AMPELOPSIS CORDATA Michx.

Leaves similar to those of some *Vitis* but this species has a white pith in the stems while that of *Vitis* is light brown. Tex, Okla, Mo, Ill, Ind, O. (40)

3. AMPELOPSIS BREVIPEDUNCULATA (Maxim.) Trautv.

Uncommon escape from cultivation, then often rampant. Native of Asia. *A. heterophylla* Sieb. & Zucc. [S]. O, Pa. (—)

4. AMPELOPSIS ACONITIFOLIA Bunge.

Not illustrated.

A native of N China. In alluvial woods, Orange Co., N. C. Apparently persisting or an escape from planting by Mr. F. J. le Clair in the for-

mer nursery of the Soil Conservation Service SE of Chapel Hill. Soil Conservation records indicate that the original source was from the Nursery of the Plant Introduction Station, U. S. Department of Agriculture, Glendale, Maryland. SE only. (—)

4918. CISSUS L.

CISSUS INCISA (Nutt.) Des Moulins MARINE-VINE, MARINE IVY

Main stems to 21 cm diam. Tex, Okla, Mo. (—)

PASSIFLORACEAE **PASSION-FLOWER FAMILY**

Woody vines or herbs.

5372. PASSIFLORA L.

PASSIFLORA PALLIDA L. PASSION-FLOWER

Branches are susceptible to winter kill in N part of range. *P. suberosa* L. Fla only. (12, 24, 36)

ARALIACEAE **GINSENG FAMILY**

Trees, woody vines, or herbs.

5855. HEDERA L.

HEDERA HELIX L. ENGLISH IVY

Leaves evergreen. Plants often trailing. A native of Europe. Frequently cultivated and rarely escaped, apparently by vegetative means. Mo. (48, 96)

ERICACEAE **HEATH FAMILY**

Shrubs, trees, or woody vines.

6200A. PIERIS D. Don

PIERIS PHILLYREIFOLIA (Hook.) DC. CLIMBING HEATH

Unique in climbing in crevices of bark or beneath outer bark of *Taxodium ascendens*. It also climbs *Pinus* but rarely, at least once has been noted climbing Titi (presumably *Cyrilla* or *Cliftonia)* in the vicinity of St. Andrews Bay (apparently Bay Co., Fla), and often grows as a shrub. *Ampelothamnus phillyreifolius* (Hook.) Small [S]. SE only. (—)

LOGANIACEAE **LOGANIA FAMILY**

Woody vines or herbs.

6447. GELSEMIUM Juss.

Flowers fragrant; length-width ratio of largest leaf blades 2.9-5.1; body of fruit 14-23 mm long and 8-11 mm wide; seeds winged.
. . . . . 1—G. SEMPERVIRENS

Flowers usually not fragrant; length-width ratio of largest leaf blades 1.0-3.9; body of fruit 9-12.5 mm long and 5.5-8 mm wide; seeds not winged. . . . . 2—G. RANKINII

1. GELSEMIUM SEMPERVIRENS (L.) Jaume Saint-Hilaire
YELLOW JASMINE

Most often of upland habitats. Density and size of stomates may be used to separate this species from the following should identification of sterile material be important. Duncan* found that in *G. sempervirens* the stomates averaged from 20-34 per .0926 sq. mm, 25-37 μ long, and 19-26 μ wide, whereas in *G. rankinii* the values were 34-46, 18.5-26 μ and 13.5-19 μ. Leaves of the previous year of this and the following species are often all shed by sometime in the summer, especially in the more northern parts of their ranges. Therefore, it may then be difficult to determine whether or not the leaves are evergreen. Under these circumstances separation of *Gelsemium* plants by this character from sterile material of *Trachelospermum difforme* may be difficult. However, plants of *Gelsemium* may be distinguished from those of *Trachelospermum* by the absence of stipules on petioles. Small narrow stipules are present at the very base of the petioles of the latter. The stipules often fall from older leaves. Tex. (16)

2. GELSEMIUM RANKINII Small SWAMP YELLOW JASMINE

Confined to wet habitats. Generally flowering later than *G. sempervirens*. SE only. (8)

APOCYNACEAE **DOGBANE FAMILY**

Trees, shrubs, woody vines, or perennial herbs.

6667. TRACHELOSPERMUM Lemaire

TRACHELOSPERMUM DIFFORME (Walt.) Gray CLIMBING DOGBANE

Flowers quite fragrant. Tex, Okla, Mo, Ill, Ind. (—)

ASCLEPIADACEAE **MILKWEED FAMILY**

Perennial herbs or woody vines.

6733. PERIPLOCA L.

PERIPLOCA GRAECA L. SILK VINE

Native of Europe. Known as escape in Knox Co., Tenn. (22, 24)

6797A. CYNANCHUM L.

CYNANCHUM SCORPARIUM Nutt. CYNANCHUM

Mostly herbaceous in the northern part of its range. Often almost leafless as season progresses, but then usually conspicuous because of abundant branches. Similar to the herbaceous *Seutera maritima* Decne. *Amphistelma scoparium* (Nutt.) Small [S]. SE only. (—)

BIGNONIACEAE **TRUMPET CREEPER FAMILY**

Trees or woody vines.

7705. ANISOSTICHUS Bureau

ANISOSTICHUS CAPREOLATA (L.) Bureau CROSS-VINE

Cross sections of the stem reveal a cross-shaped pith, hence the common name. The large tubular corollas are orange-yellow outside and

yellow within. *A. crucigera* (L.) Bureau [S]. *Bignonia capreolata* L. [F]. Tex, Okla, Mo, Ill, Ind, O. (40)

7714. CAMPSIS Lour.

CAMPSIS RADICANS (L.) Seem. TRUMPET CREEPER, COW-ITCH

The large tubular corollas are scarlet or reddish outside. Some persons are quite allergic to plants of this species. *Bignonia radicans* L. [S]. All adjacent states. (40)

CAPRIFOLIACEAE HONEYSUCKLE FAMILY

Shrubs, woody vines, or herbs.

8523. LONICERA L.

a. Flowers and fruits 2 (or by abortion one) on peduncles in leaf axils; leaves all separate from each other, the blades sometimes lobed. . . . . 1—L. JAPONICA

a. Flowers and fruits in terminal clusters; uppermost leaves, especially those below the flowers and fruits, united around the stem (connate), the blades never lobed. . . . . b

b. Corolla 35-55 mm long, rarely shorter (as short as 20 mm in one form), slenderly trumpet-shaped, the lobes nearly equal. . . . . 2—L. SEMPERVIRENS

b. Corolla less than 35 mm long, not as slender, 2-lipped, the upper lip broad and 4-lobed, the lower narrow. c

c. Uppermost connate leaves in an orbicular to oval form, with emarginate to obtuse ends, the upper as well as lower side glaucous; corolla pale yellow. . . . . 3—L. PROLIFERA

c. Uppermost connate leaves in a more elongate form, usually obtuse to acute at ends, the upperside green or lightly glaucous; corolla orange-yellow, rarely pale yellow (if so, at least partly tinged with purple or shades of red). . . . . d

d. Underside of leaf blades glaucous; corolla 15-25 mm long, the tube stout and enlarged on one side within one mm of the base, the lobes purplish or reddish. . 4—L. DIOICA

d. Underside of leaf blades light green or pale to lightly glaucous; corolla 20-37 mm long, the tube slender with no enlargement at base (some with a slight enlargement a few mm above the base), the lobes yellow or orange. . . . . 5—L. FLAVA

1. LONICERA JAPONICA Thunb. JAPANESE HONEYSUCKLE

This species, mostly undesirable, was introduced from Asia. Plants with branchlets and leaves purple and glabrous instead of green and pubescent, and with the corolla lobes united ½ or less and more reddish outside than var. *japonica* have been distinguished as var. *chinensis* (P. W. Wats.) Baker [F]. Intermediate forms seem so abundant that the

two varieties probably cannot be maintained. All adjacent states. (18)

2. LONICERA SEMPERVIRENS L. CORAL-HONEYSUCKLE

This species is frequently used as an ornamental and has escaped. This may partly account for some of the more scattered records to the north. Var. *sempervirens* which has the upperside of leaves, hypanthium, and outside of the corolla glabrous is widespread. In the more restricted var. *hirsutula* Rehd. [F, G] these parts are hairy and/or glandular. Plants with corollas 2-3 cm long have been described as var. *minor* Ait. [F]. *Phenianthus sempervirens* (L.) Raf. (S). Tex, Okla, Mo, Ill, Pa, NJ. (18, 36)

3. LONICERA PROLIFERA (Kirchn.) Rehd.

This taxon is closely related to and intergrades with *L. dioica* and may not be separable from it, especially at the species level. Var. *glabra* Gleason with leaves glabrous beneath seems not separable from var. *prolifera* with leaves hairy beneath. *L. sullivantii* Gray [S]. Okla, Mo, Ill, Ind, O. (18)

4. LONICERA DIOICA L. LIMBER HONEYSUCKLE

L. glaucescens Rydb. [S] has been separated from this species by having the underside of leaf blades and outside of the corolla pubescent instead of glabrous. Some authors [F, G, GC] have reduced this to a variety of *L. dioica*. Other varieties have also been proposed [F, G, GC]. Further study is needed but only one taxon seems justified since characters intergrade over a wide area as well as form different combinations. Okla, Mo, Ill, Ind, O, Pa. (—)

5. LONICERA FLAVA Sims. YELLOW HONEYSUCKLE

L. flavida Cockerell [S, F]—which has also been treated as var. *flavescens* (Small) Gleason [G] and is separated on the basis of having a shorter corolla tube, a lighter colored corolla, and more hairy within—intergrades frequently with this species and is thought not to be separable. *L. flava* and *L. dioica* intergrade in the Arkansas area.

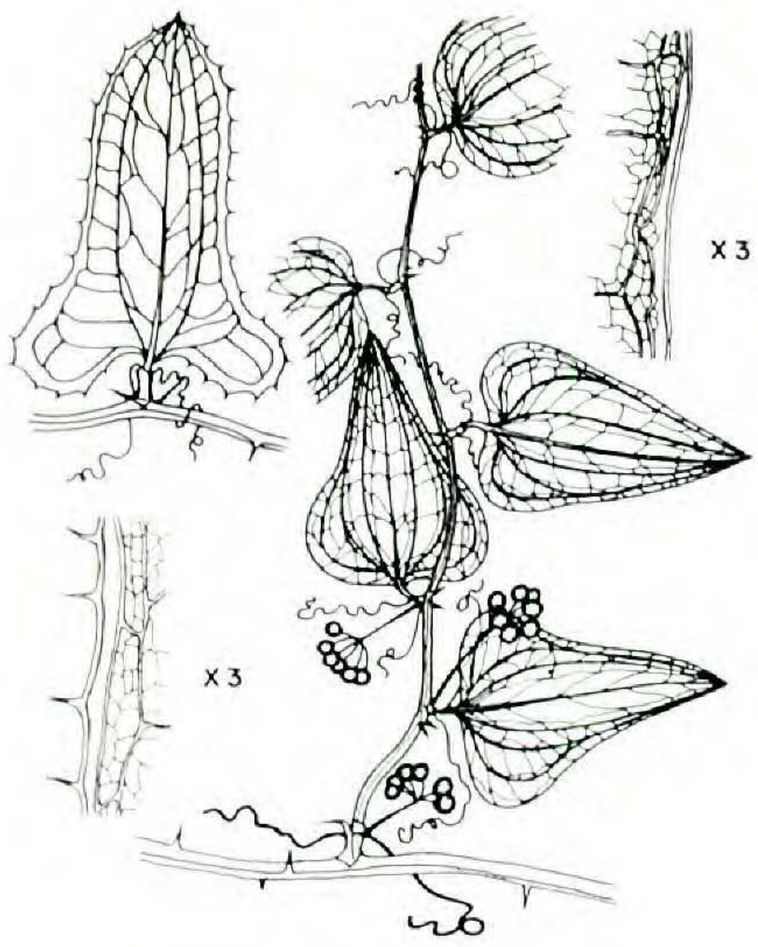
In the Ark area and in Ala (rarely) some plants have the corolla tube enlarged beginning a few to several mm from the base instead of at it. The illustration of *L. flava* in Gleason is of a specimen of this kind (from Montier, Shannon Co. in central-south Mo). Enlargement of the corolla tube some distance above the base may indicate relationship to some western element, perhaps *L. ciliosa* (Pursh) Poiret which also has a prominently enlarged tube several mm from the base. Further study is needed to determine whether or not those individuals in Ark and Ala having the corolla tube enlarged away from the base might be more appropriately placed with some far western taxon. The possibility should be considered that those individuals of *L. flava* (in the present sense) having the corrolla enlarged at the base and some far western species such as *L. ciliosa* are varieties or subspecies of the same species. Okla, Mo, Ill. (—)

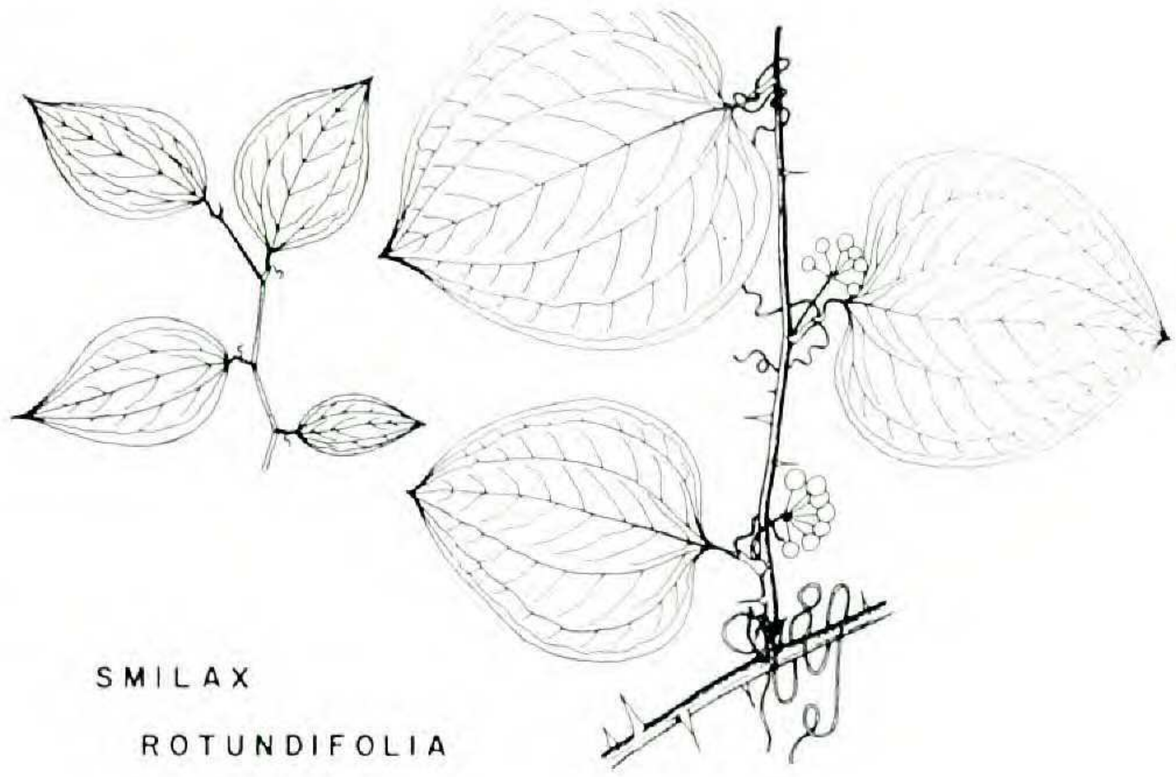
APPENDIX

Specimens examined in this study were from herbaria as follows.

Academy of Natural Sciences, Philadelphia, Pa.
University of Alabama
Braun, E. Lucy, Cincinnati, Ohio
Carnegie Museum, Pittsburgh
University of Cincinnati, Ohio
University of Delaware
Duke University, N. C.
Emory University, Ga.
Florida State University
University of Florida
Georgia Southern College
University of Georgia
Gray Herbarium, Mass.
Indiana University
University of Kentucky
Longwood College, Va.
University of Louisville, Ky.
Lynchburg College, Va.
University of Maryland
University of Mississippi
New York Botanical Garden
North Carolina State University
University of North Carolina
Shorter College, Ga.
Southern Methodist University
University of Southern Mississippi
University of Southwest Louisiana
University of Tennessee
Tulane University, La.
United States National Arboretum
United States National Herbarium
Valdosta State College, Ga.
Vanderbilt University, Tenn.
Virginia Polytechnic Institute
West Virginia University
University of Wisconsin

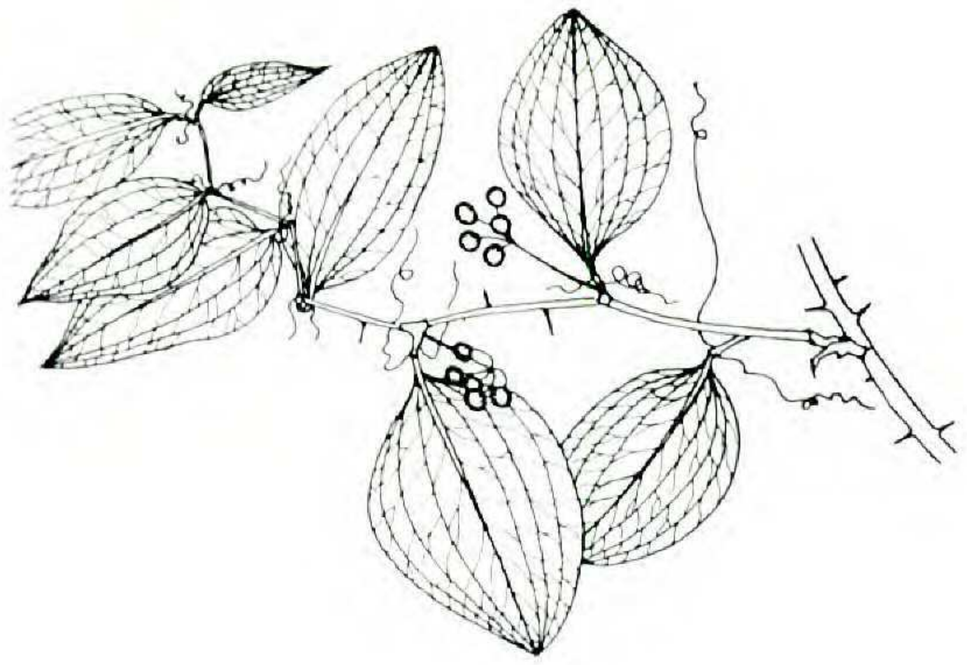
SMILAX BONA-NOX

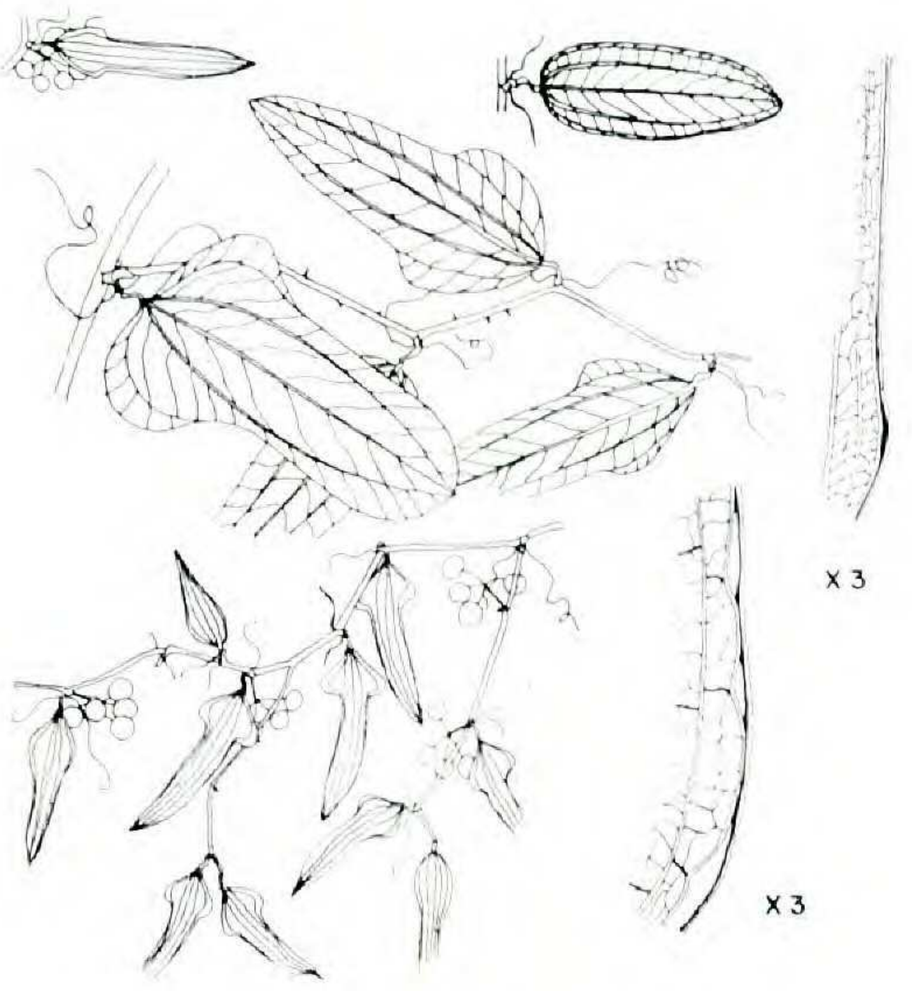




SMILAX
ROTUNDIFOLIA

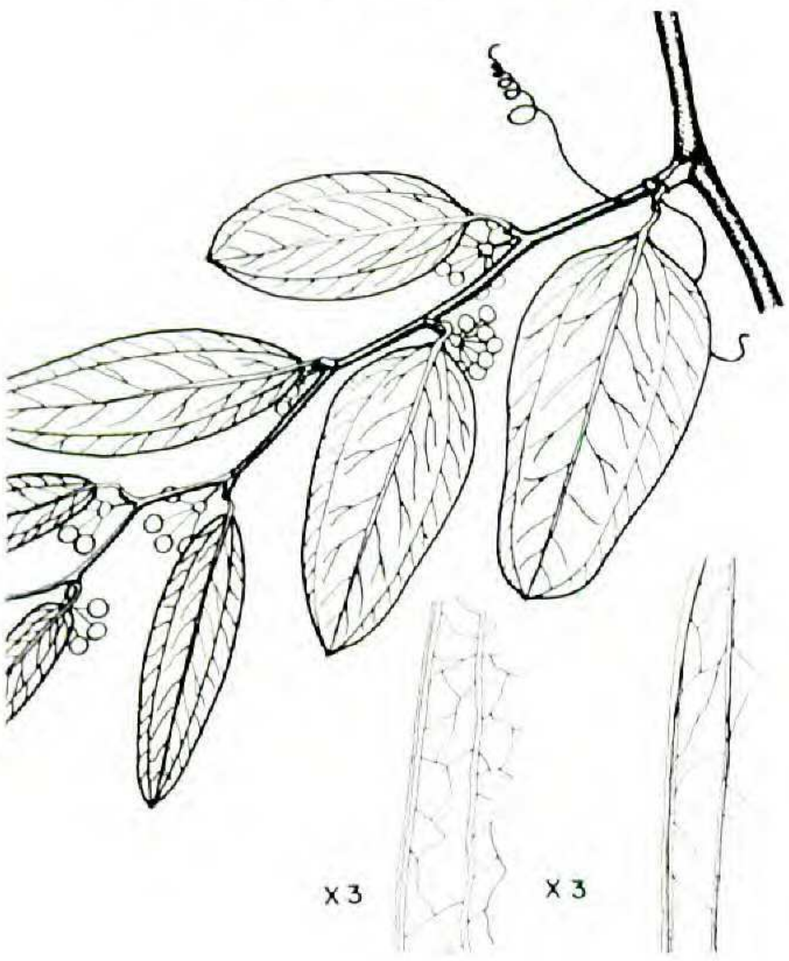
SMILAX GLAUCA



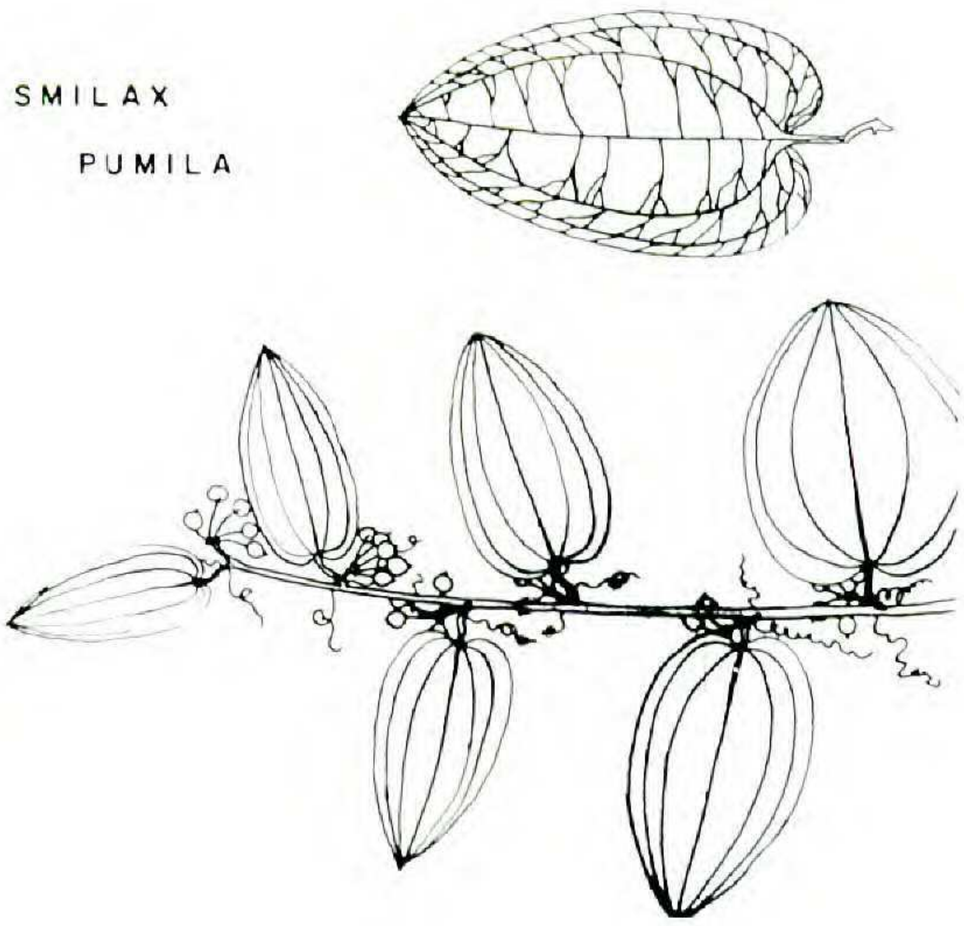


SMILAX AURICULATA

SMILAX LAURIFOLIA

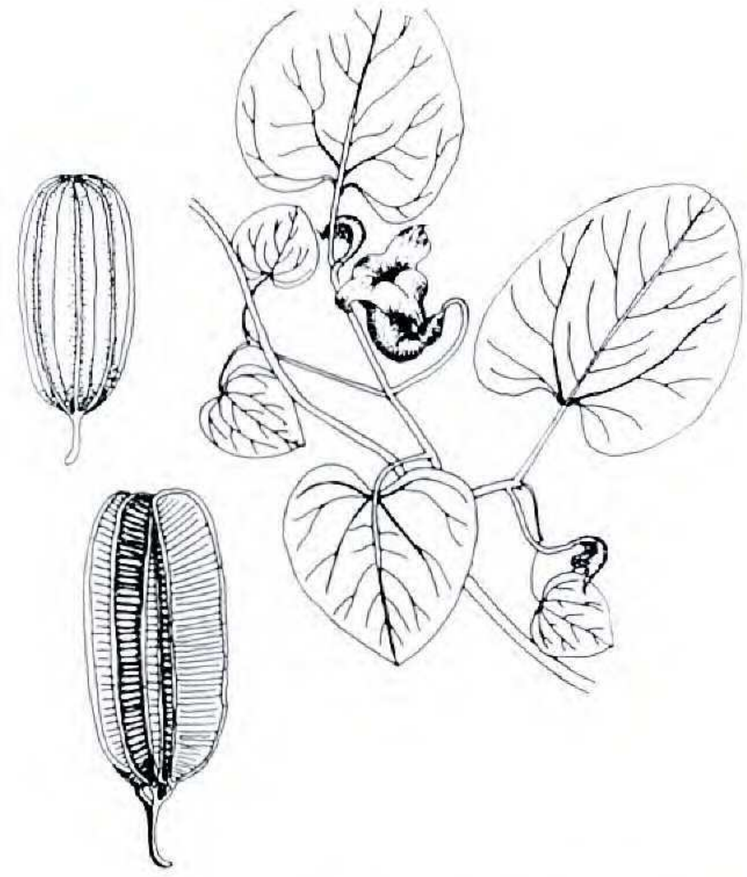


SMILAX
PUMILA

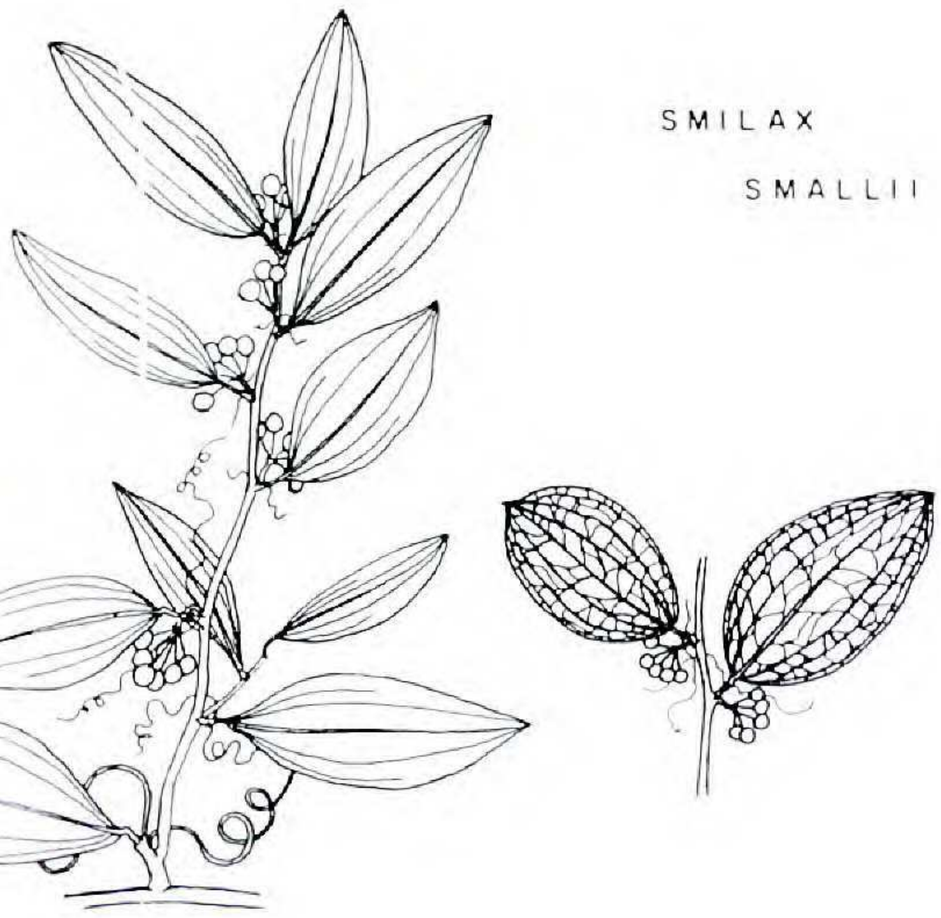


SMILAX

WALTERI

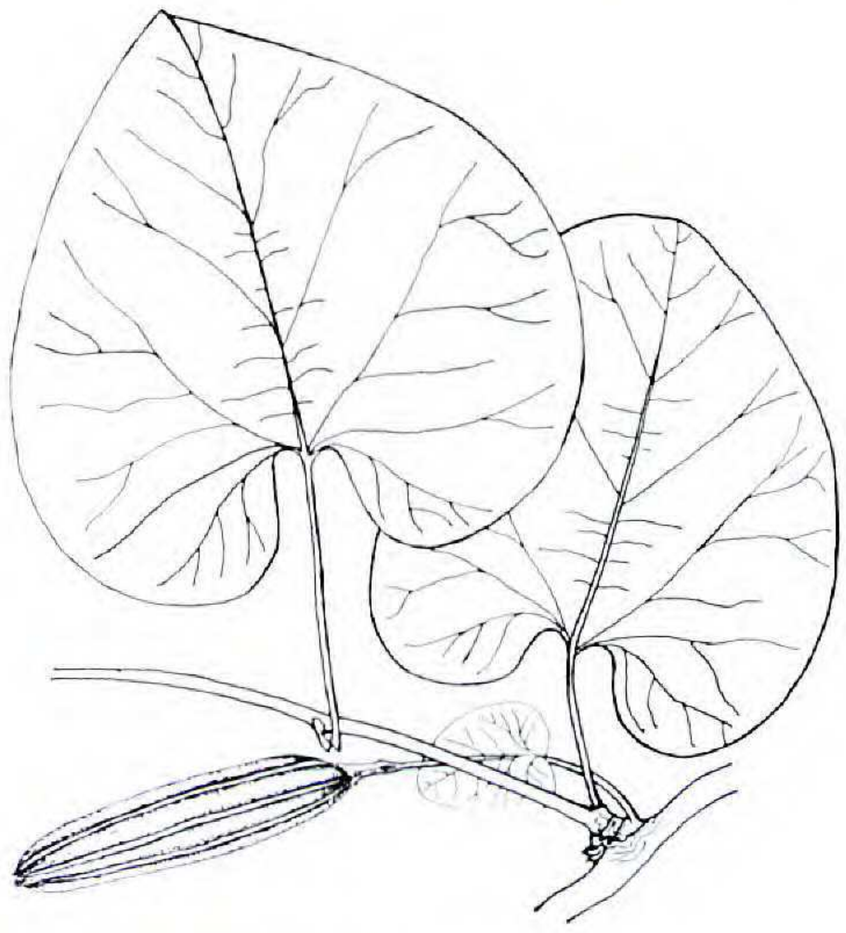


ARISTOLOCHIA TOMENTOSA

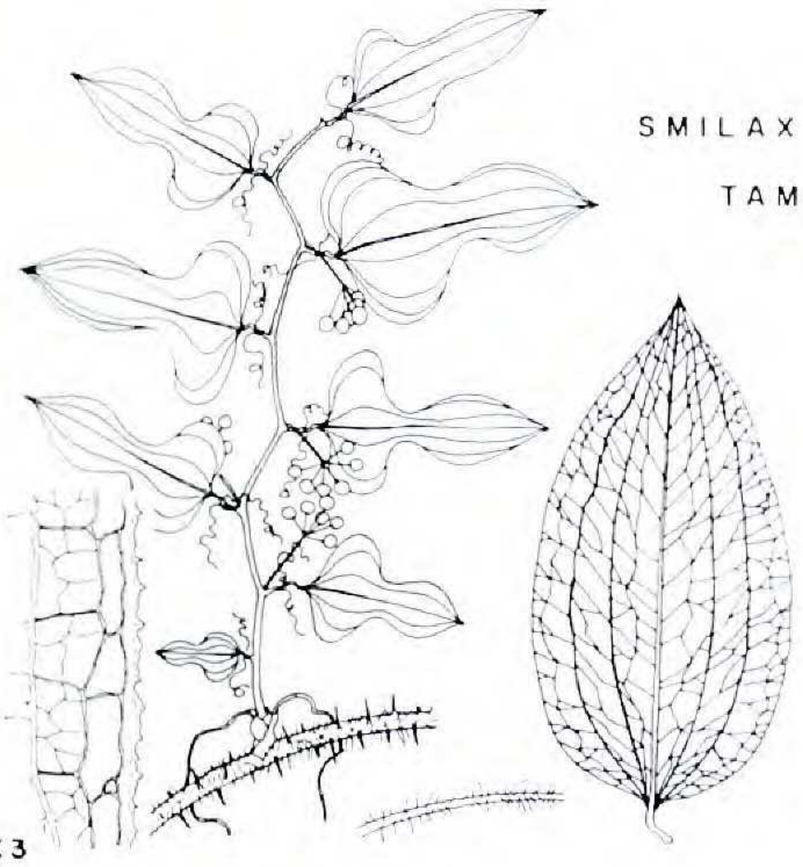


SMILAX

SMALLII



ARISTOLOCHIA MACROPHYLLA



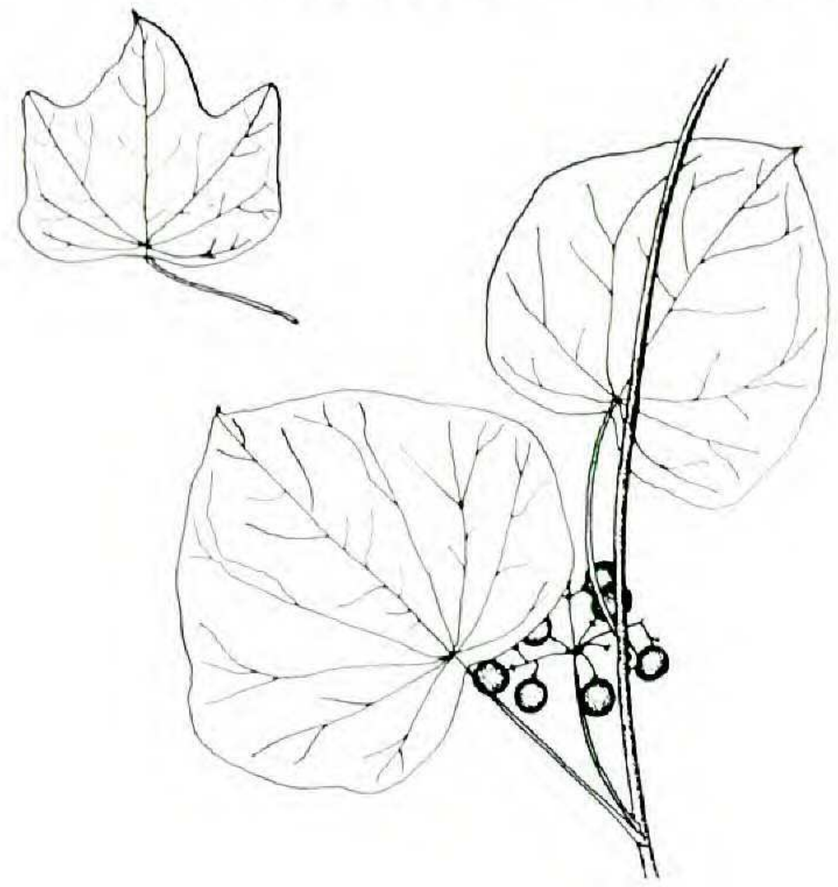
SMILAX

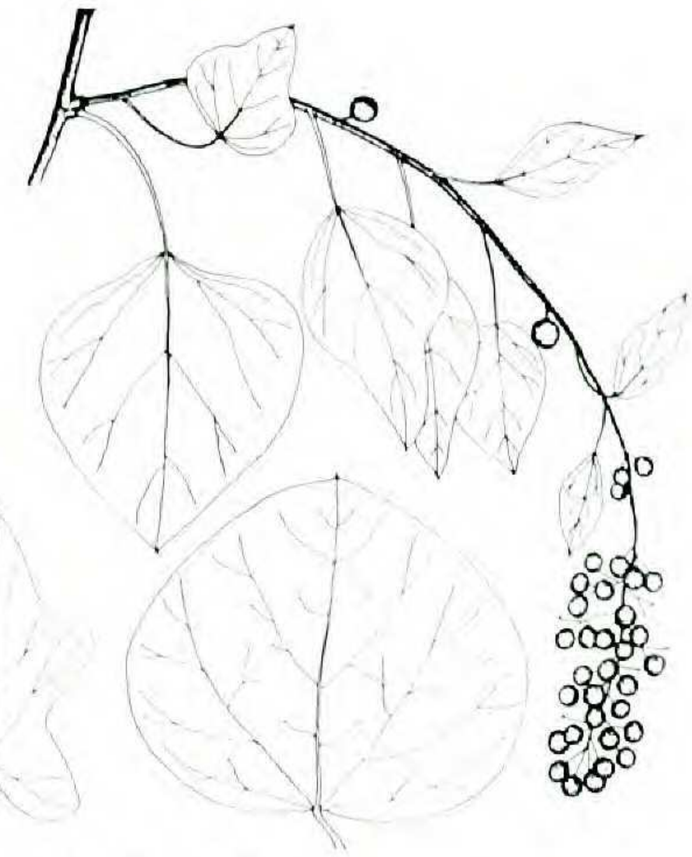
TAMNOIDES

X3

BRUNNICHIA CIRRHOSA

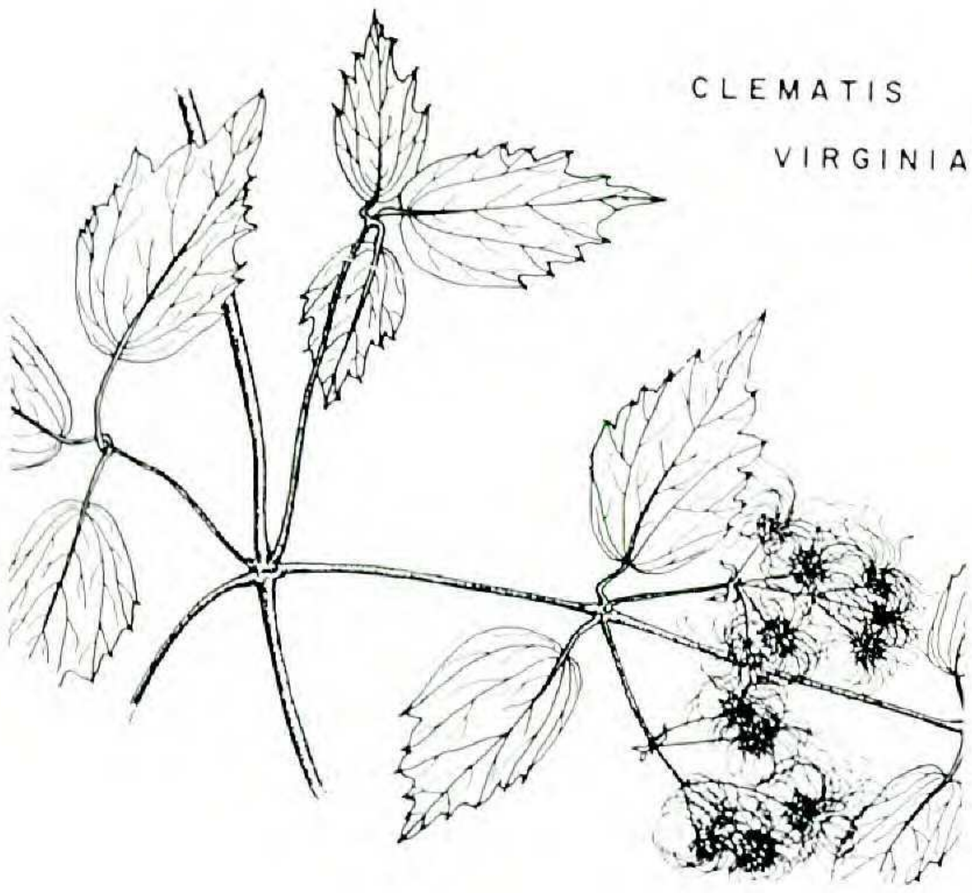
MENISPERMUM CANADENSE

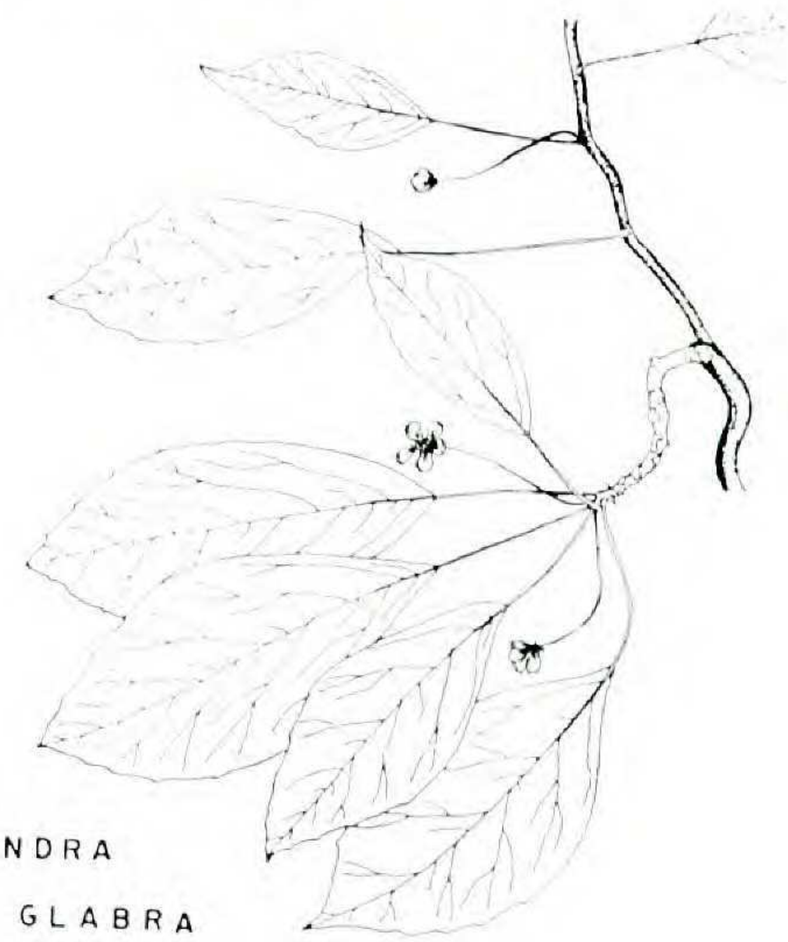




COCCULUS CAROLINUS

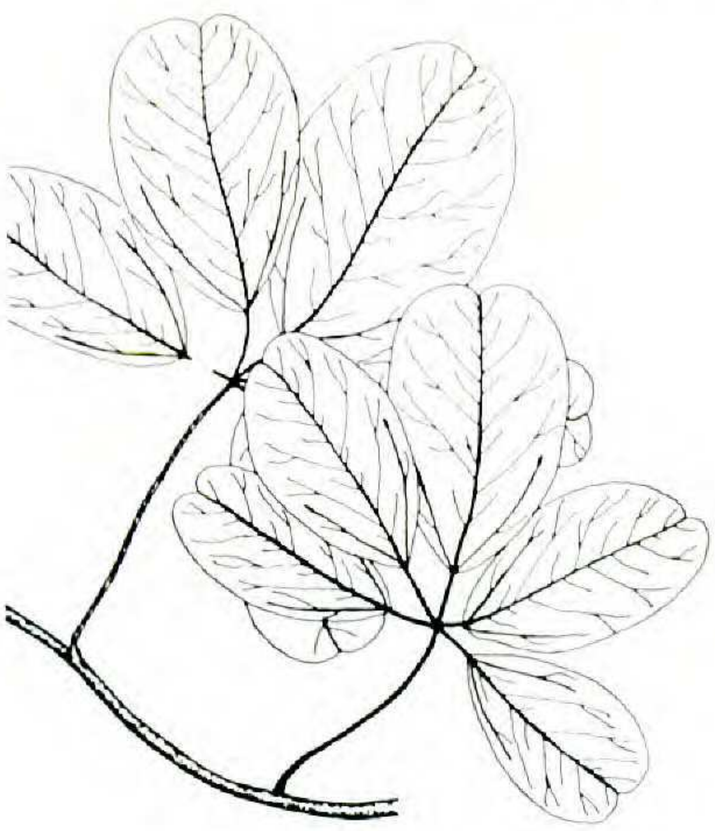
CLEMATIS
VIRGINIANA



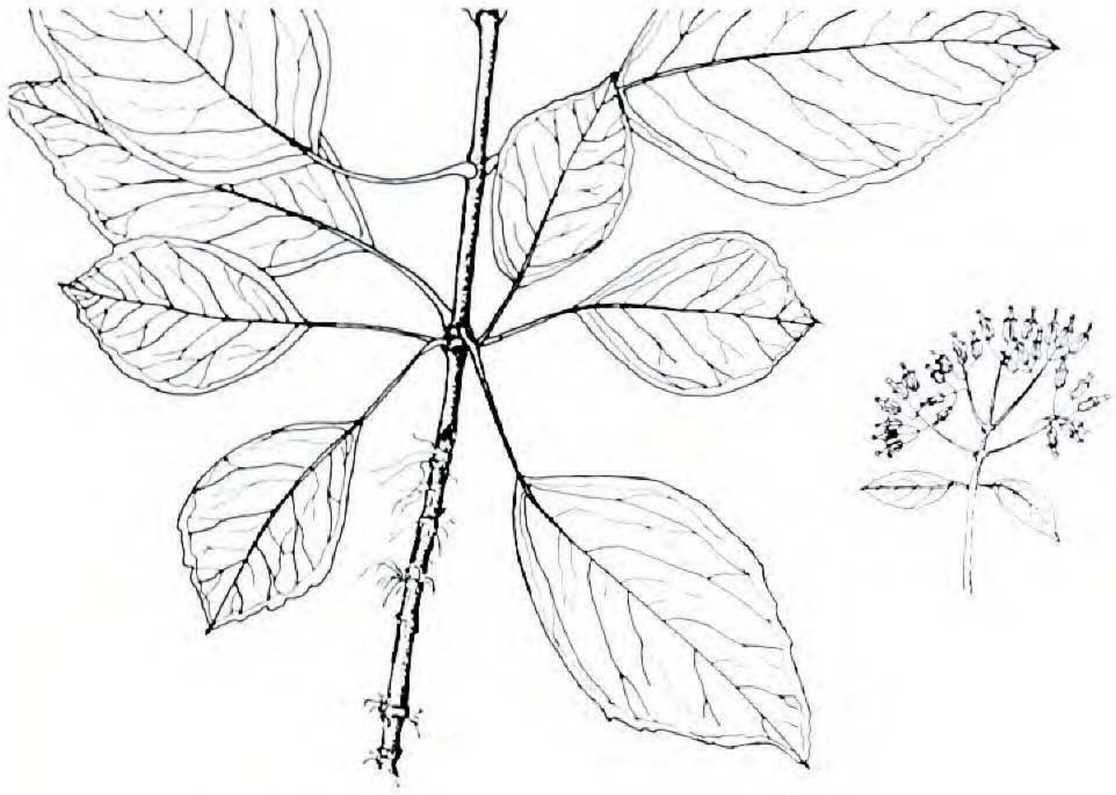


SCHISANDRA
GLABRA

AKEBIA QUINATA

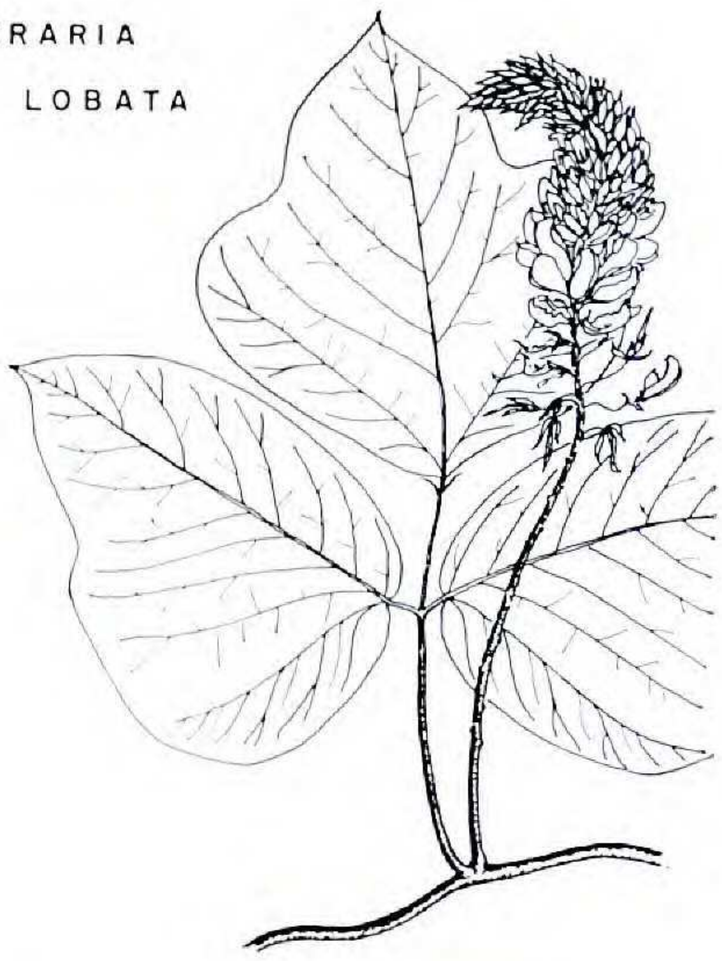


CALYCOCARPON LYONII



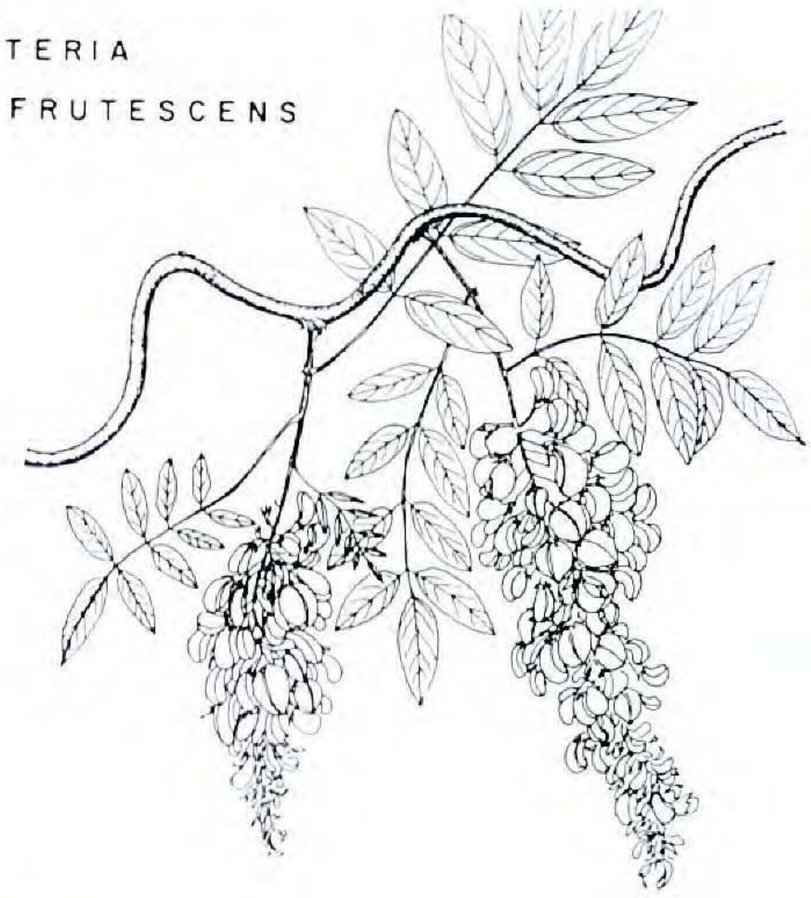
DECUMARIA BARBARA

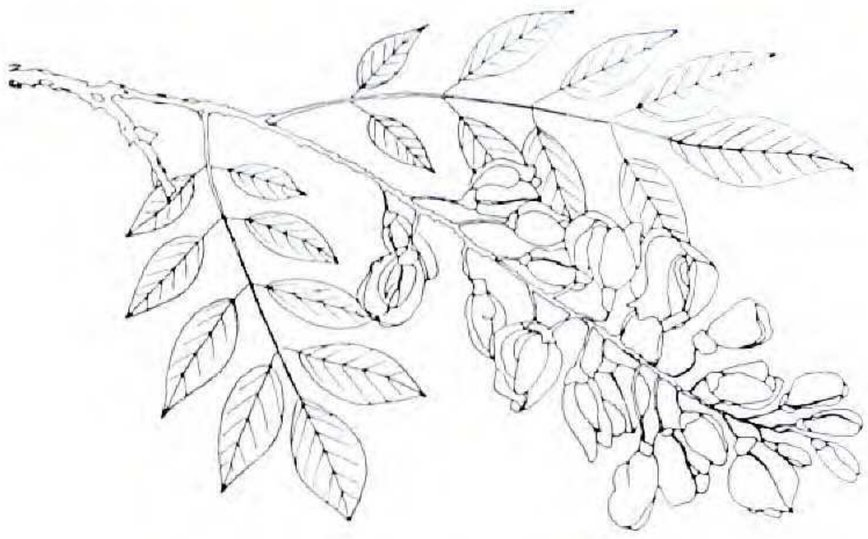
PUERARIA
LOBATA



WISTERIA FLORIBUNDA

WISTERIA
FRUTESCENS

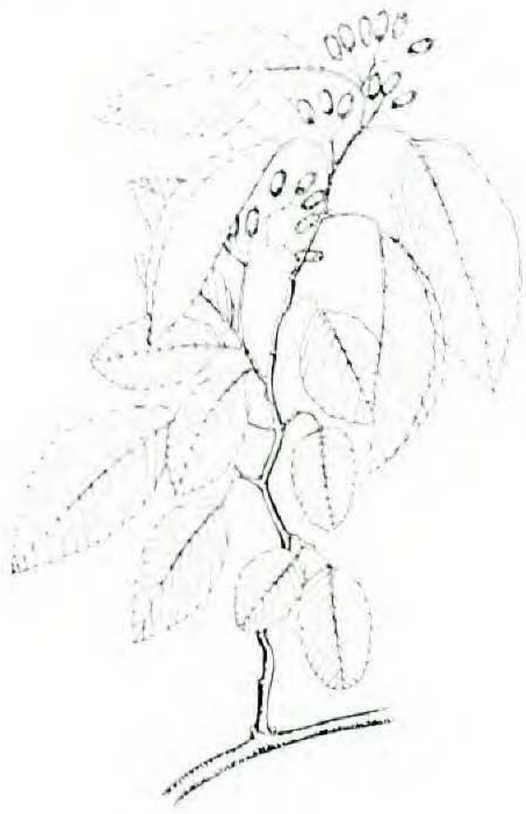




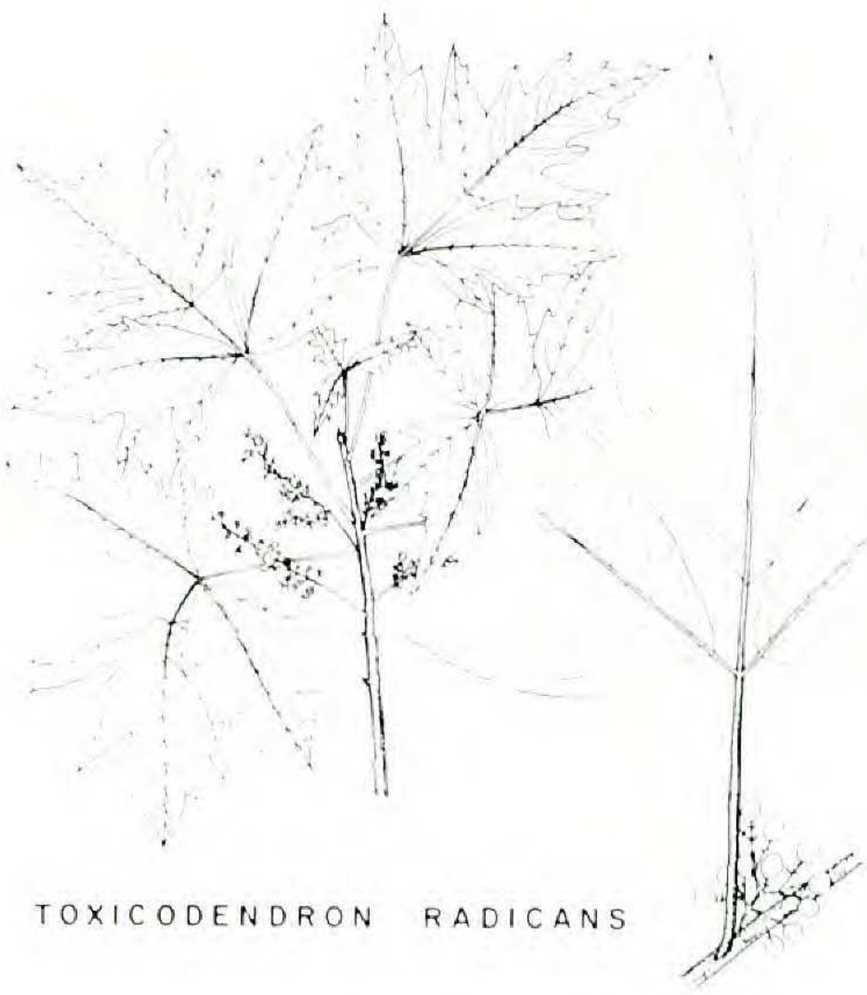
WISTERIA SINENSIS

WISTERIA
MACROSTACHYA

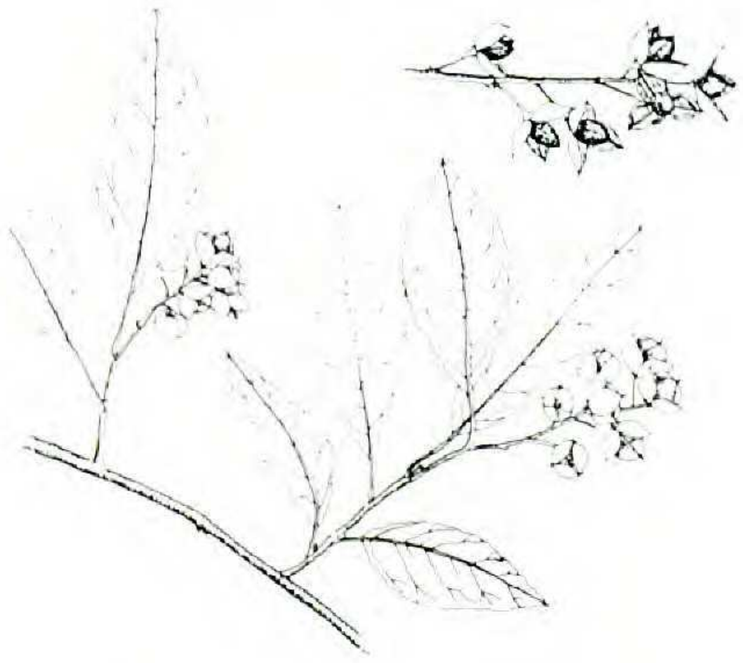
BERCHEMIA SCANDENS



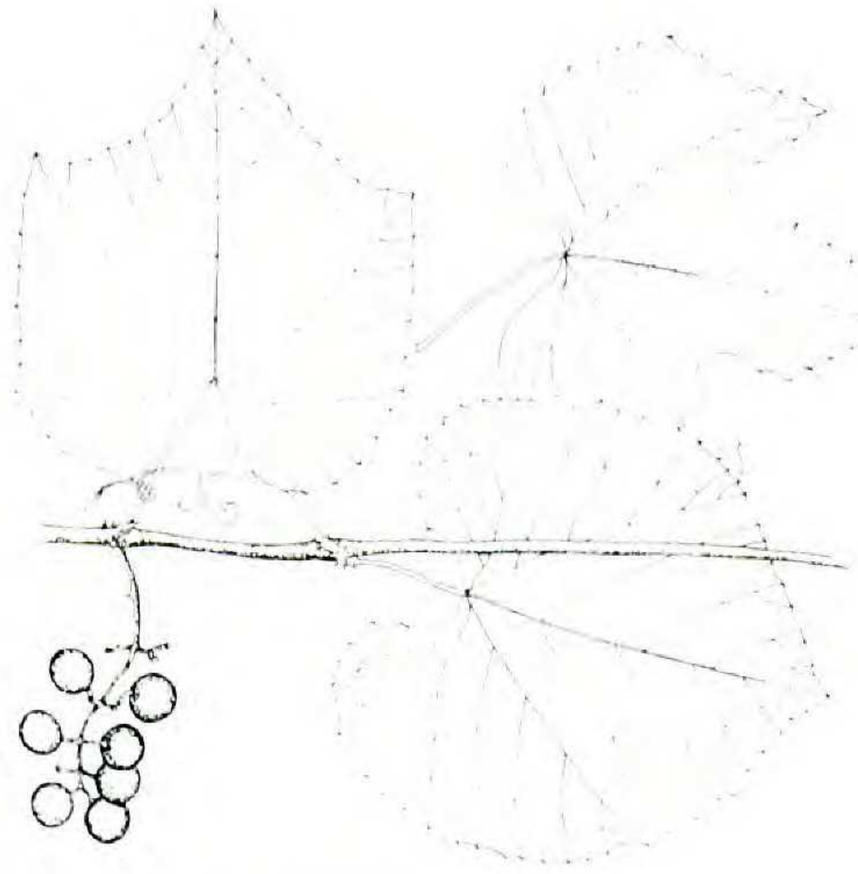
TOXICODENDRON RADICANS



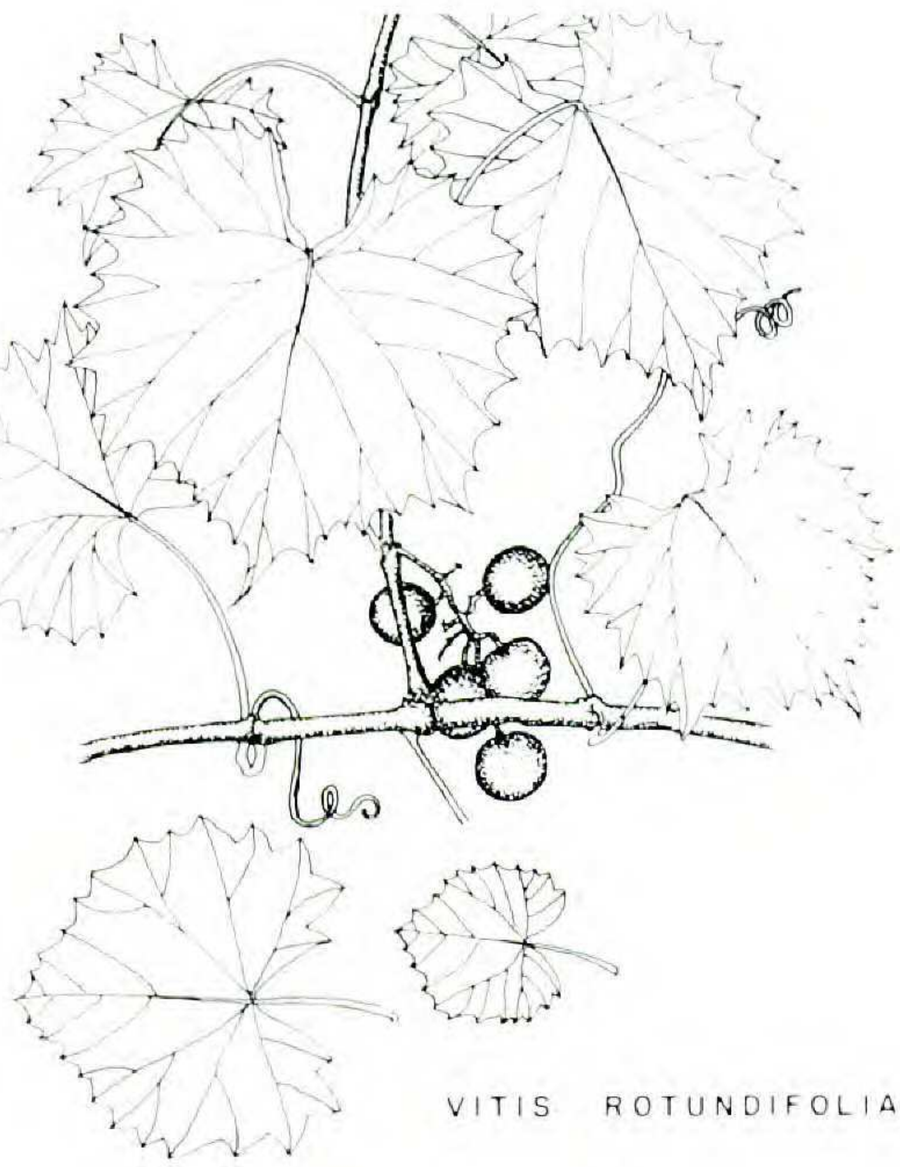
CELASTRUS SCANDENS



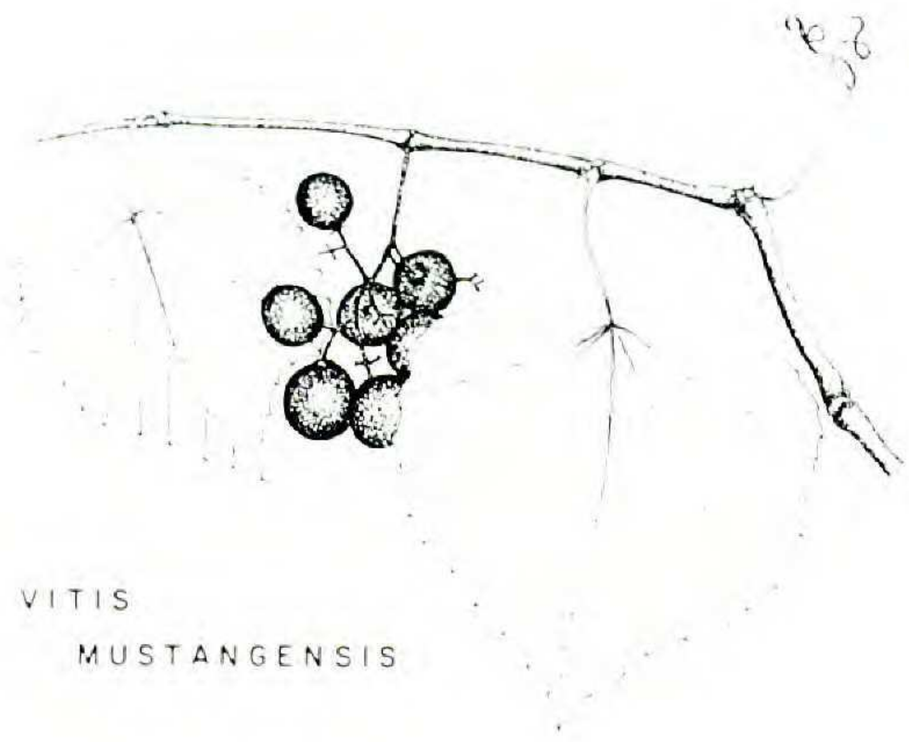
VITIS LABRUSCA



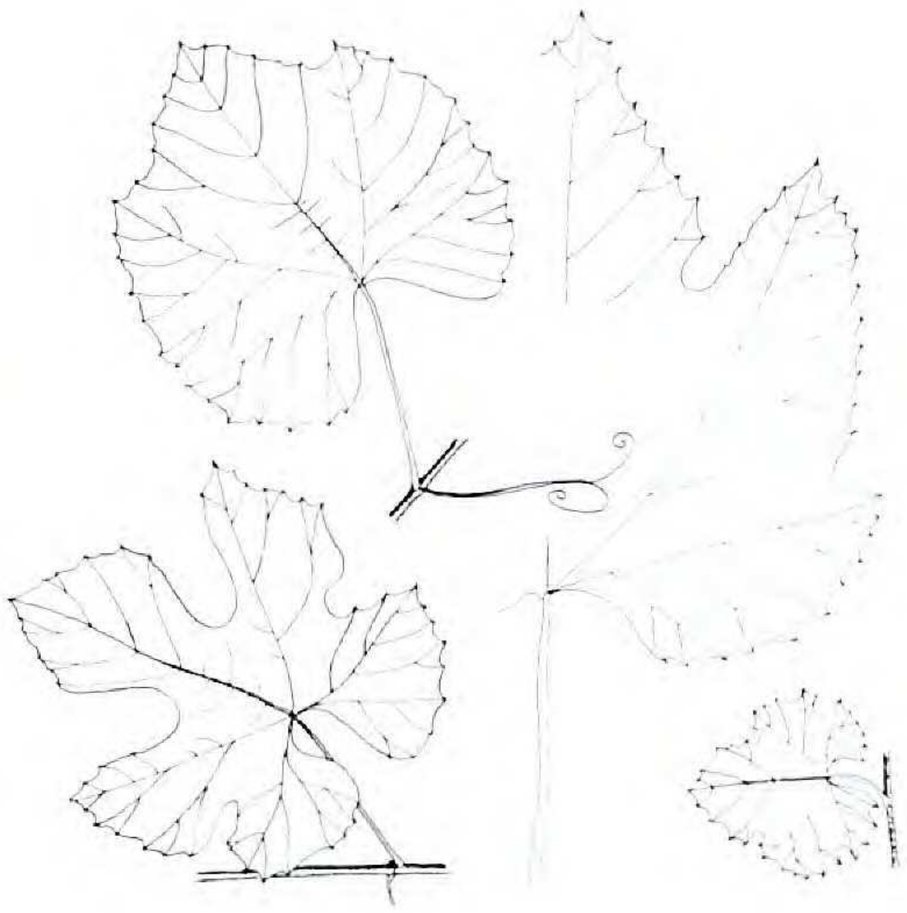
VITIS ROTUNDIFOLIA



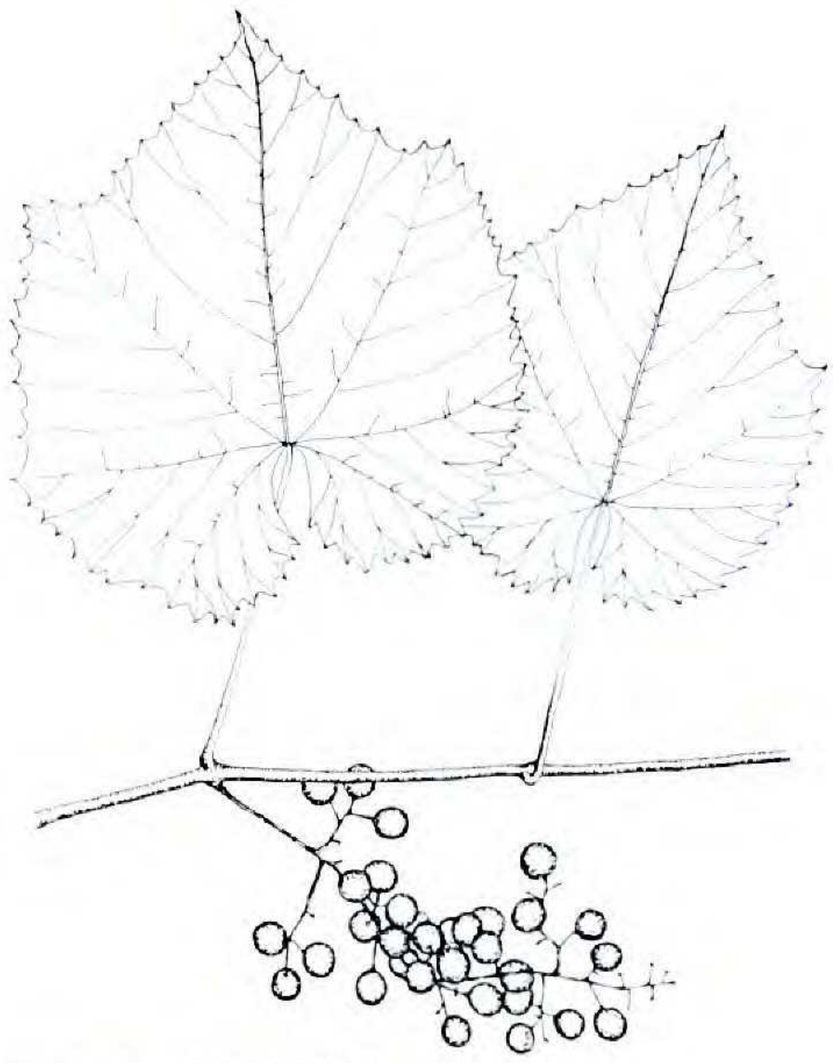
VITIS
MUSTANGENSIS



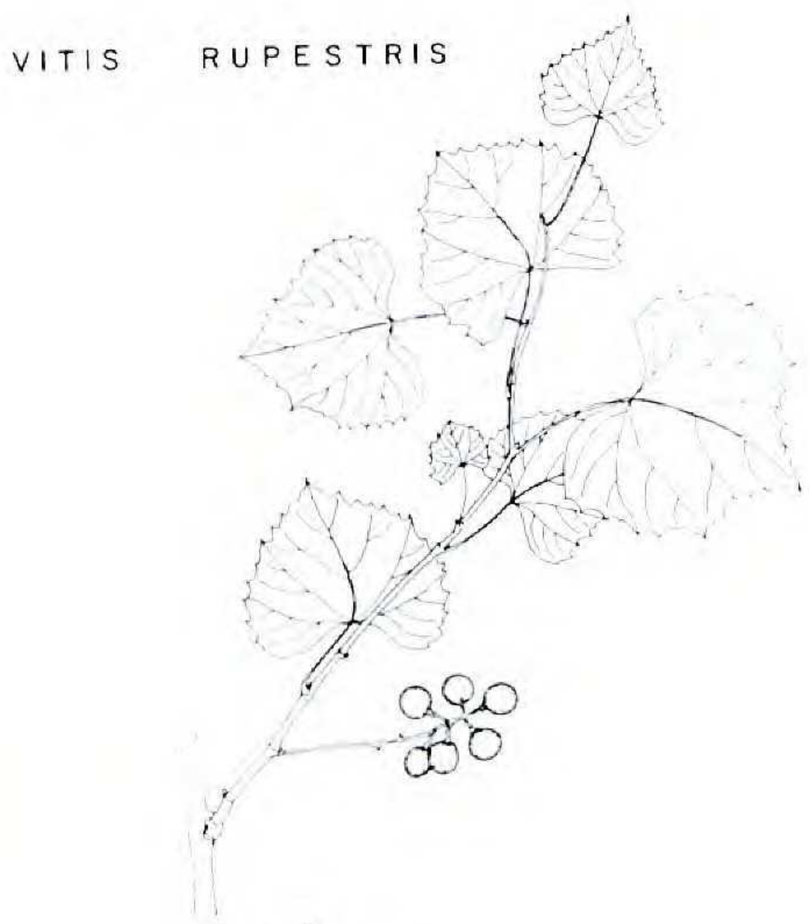
VITIS AESTIVALIS



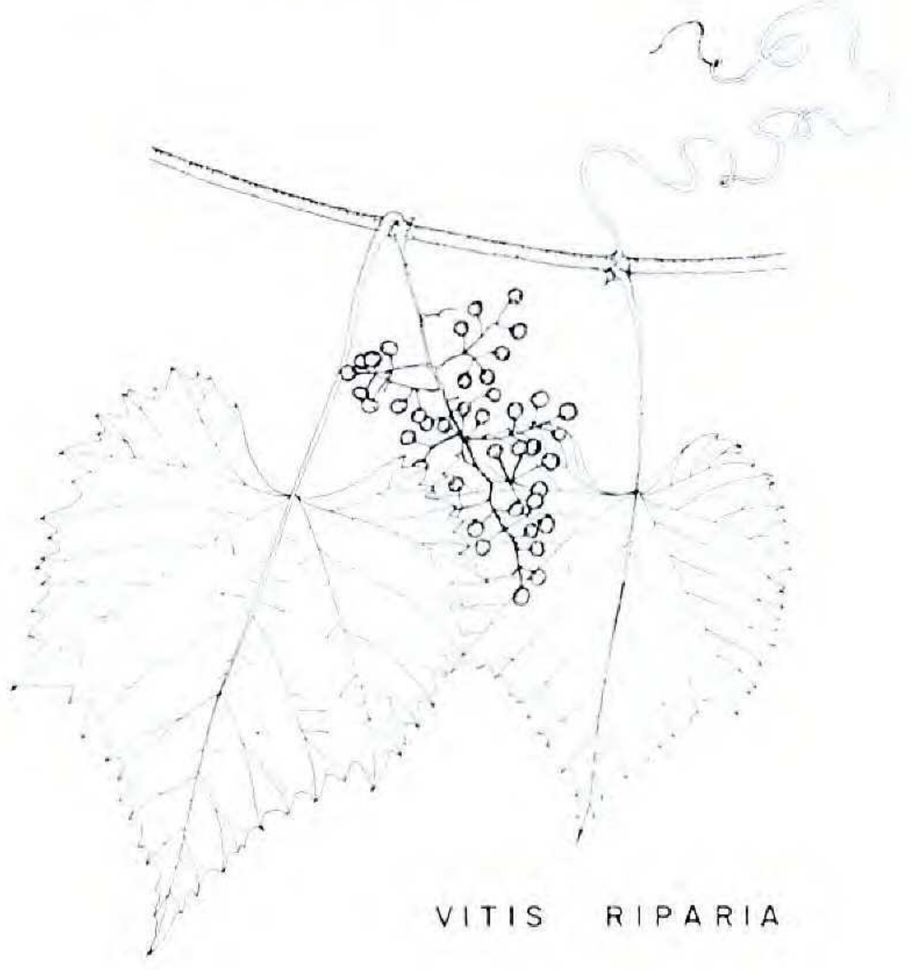
VITIS CINEREA



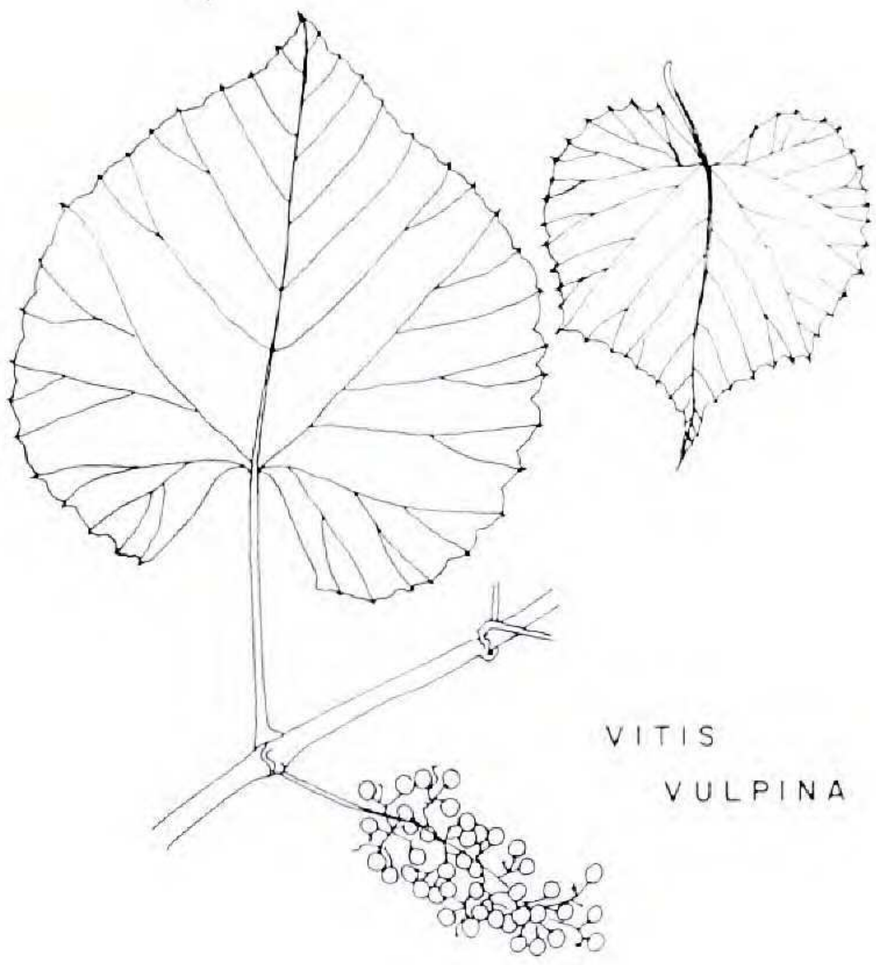
VITIS RUPESTRIS



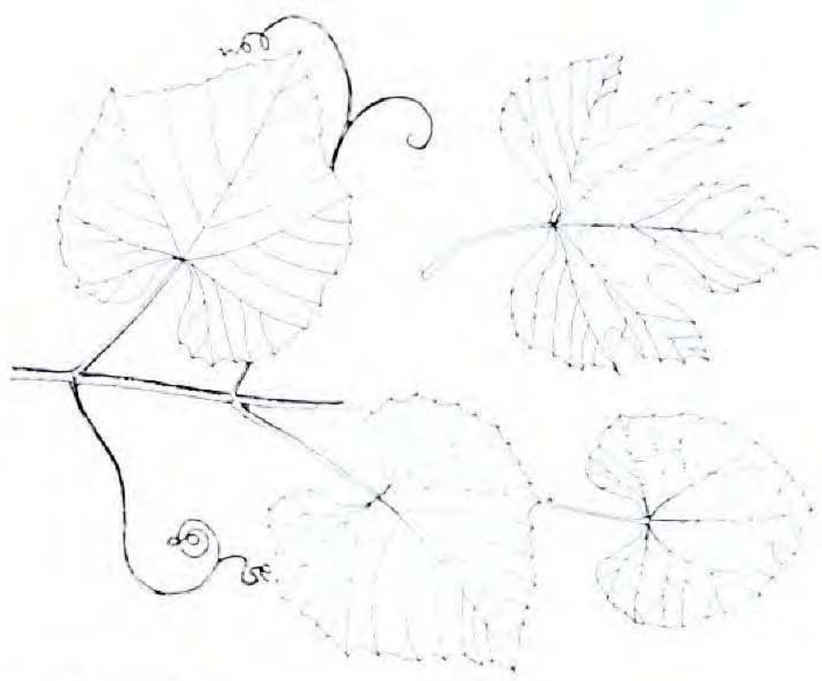
VITIS RIPARIA



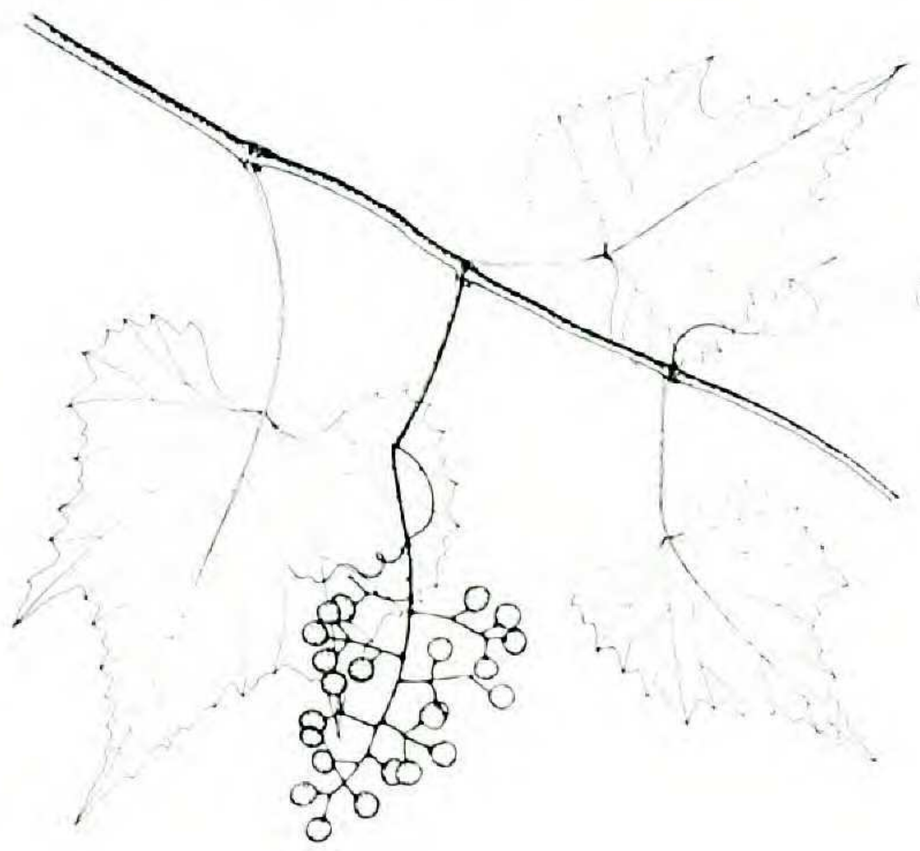
VITIS VULPINA



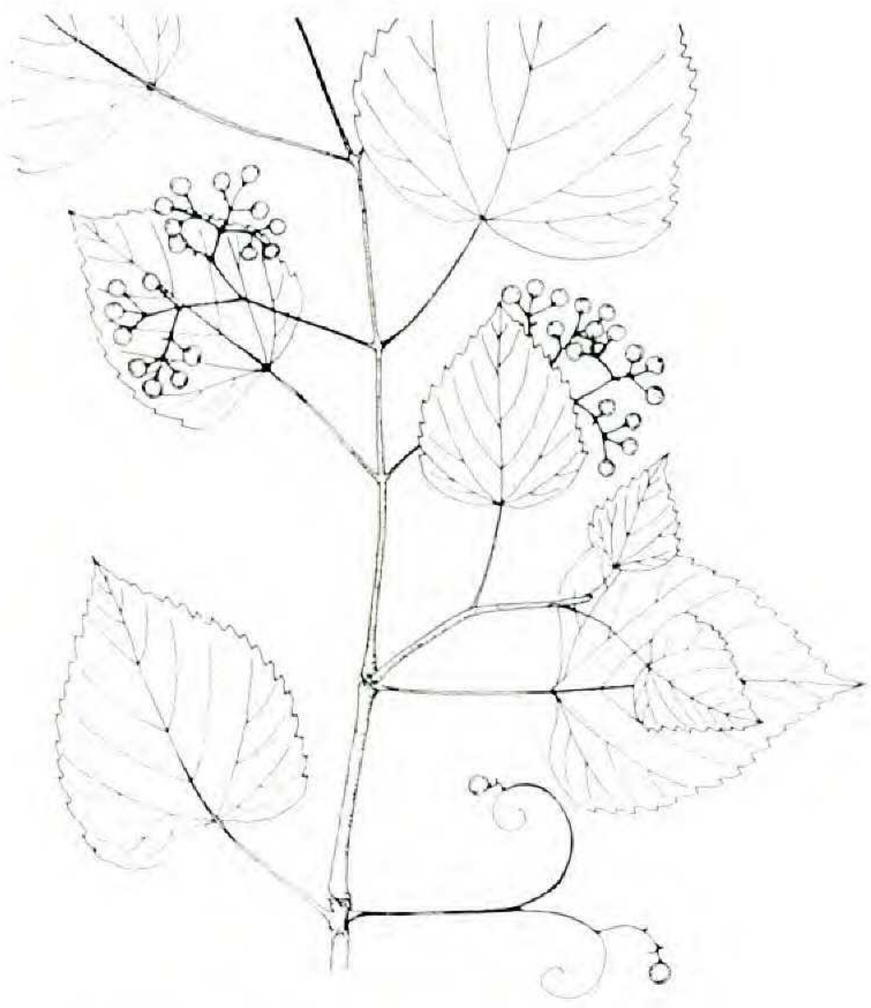
VITIS SHUTTLEWORTHII



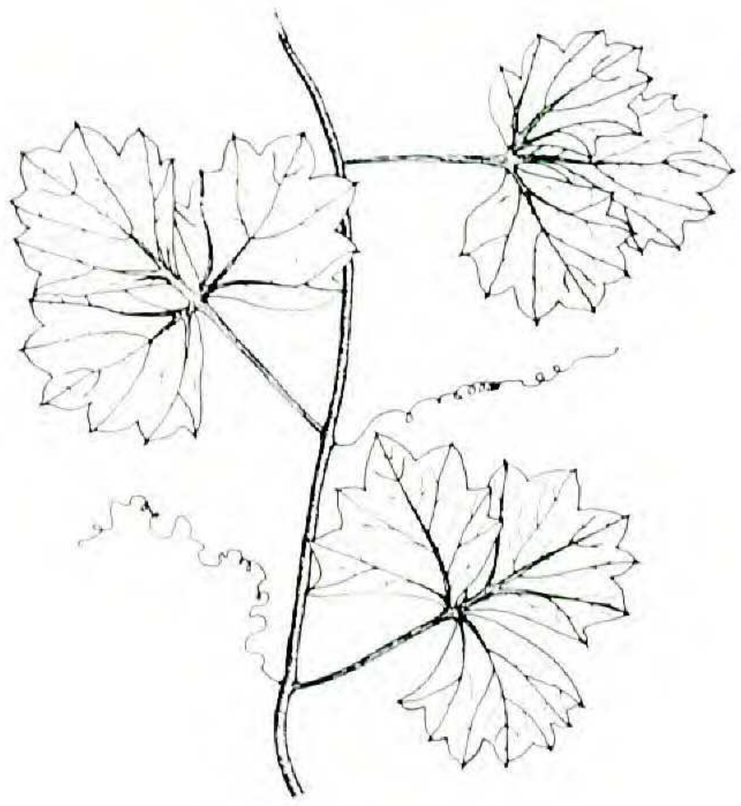
VITIS PALMATA



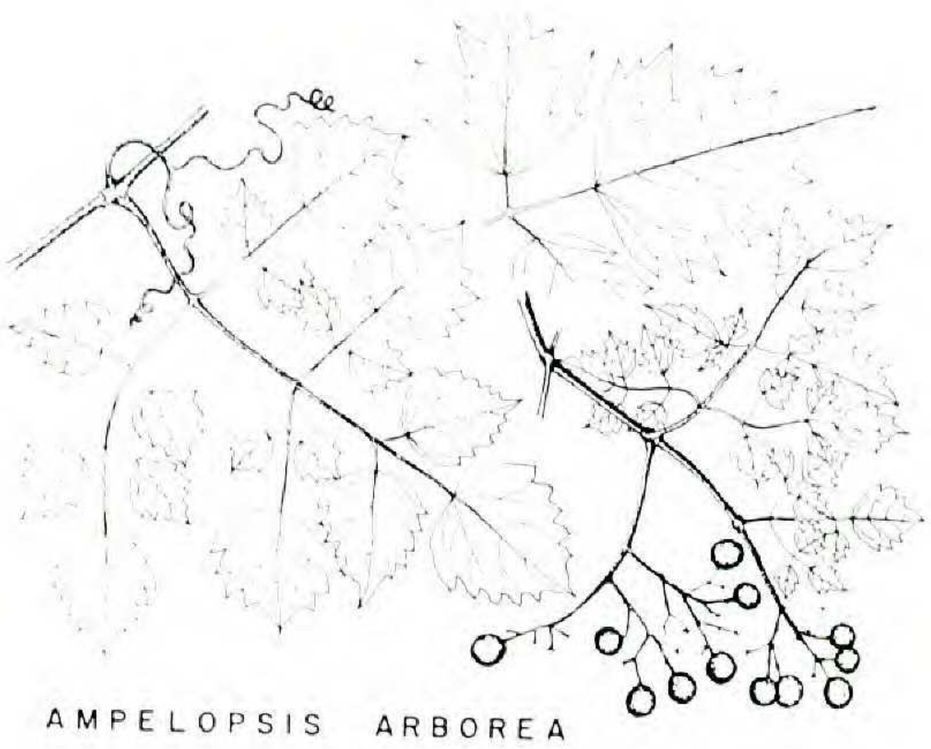
AMPELOPSIS CORDATA



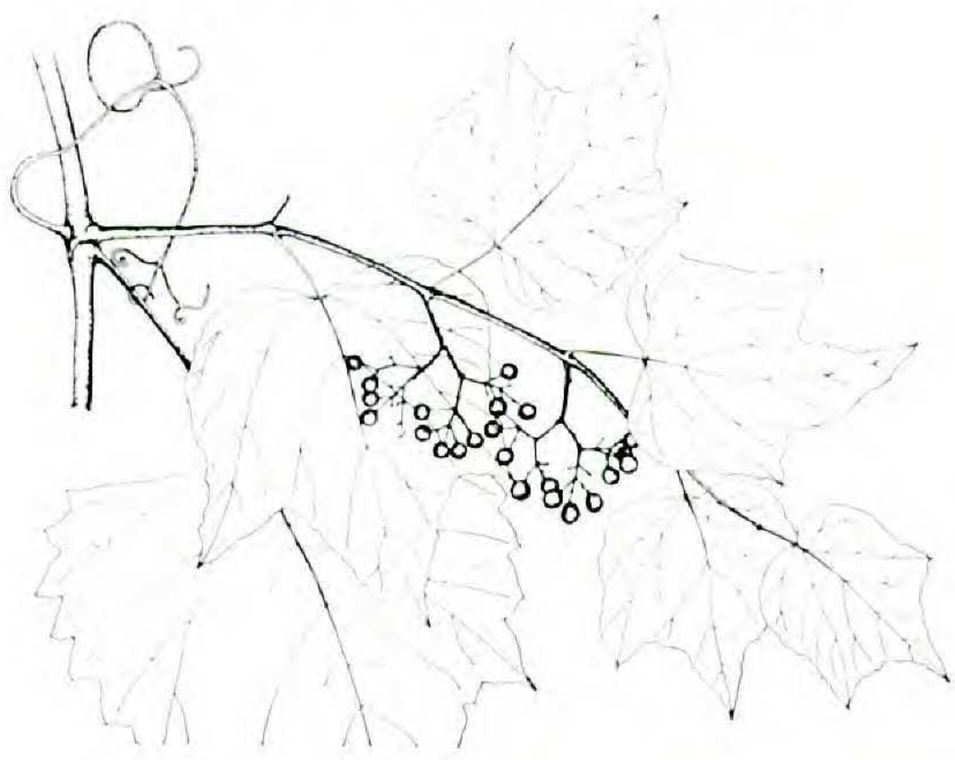
CISSIS INCISA



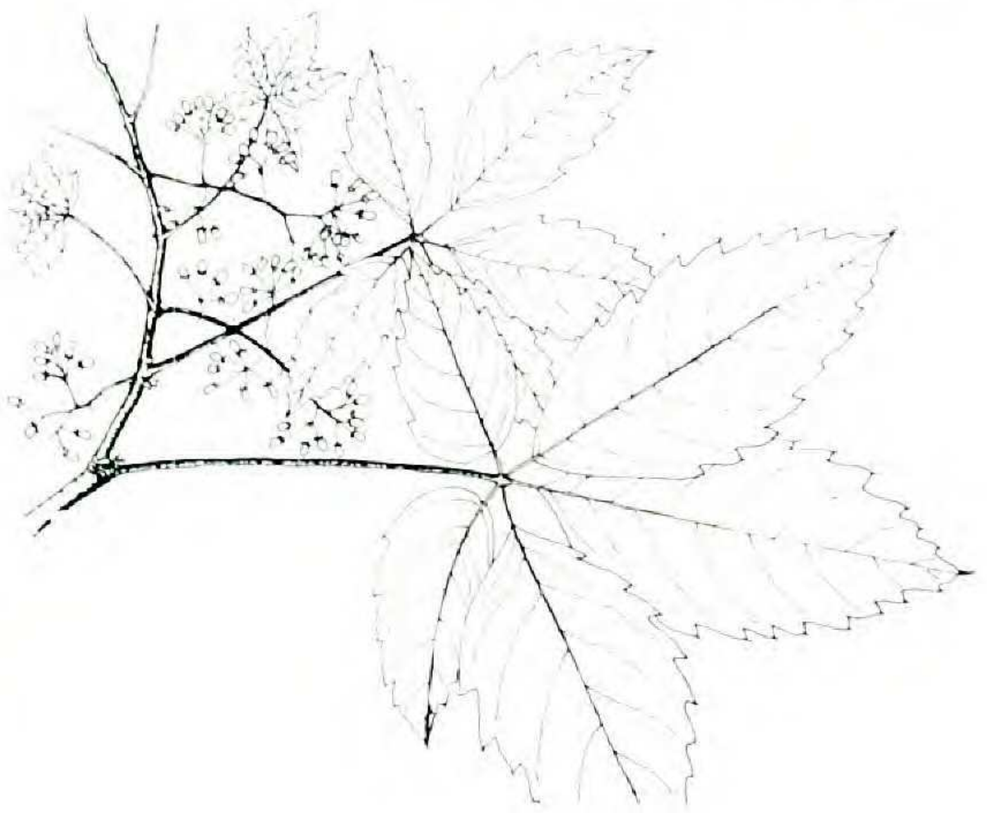
AMPELOPSIS ARBOREA



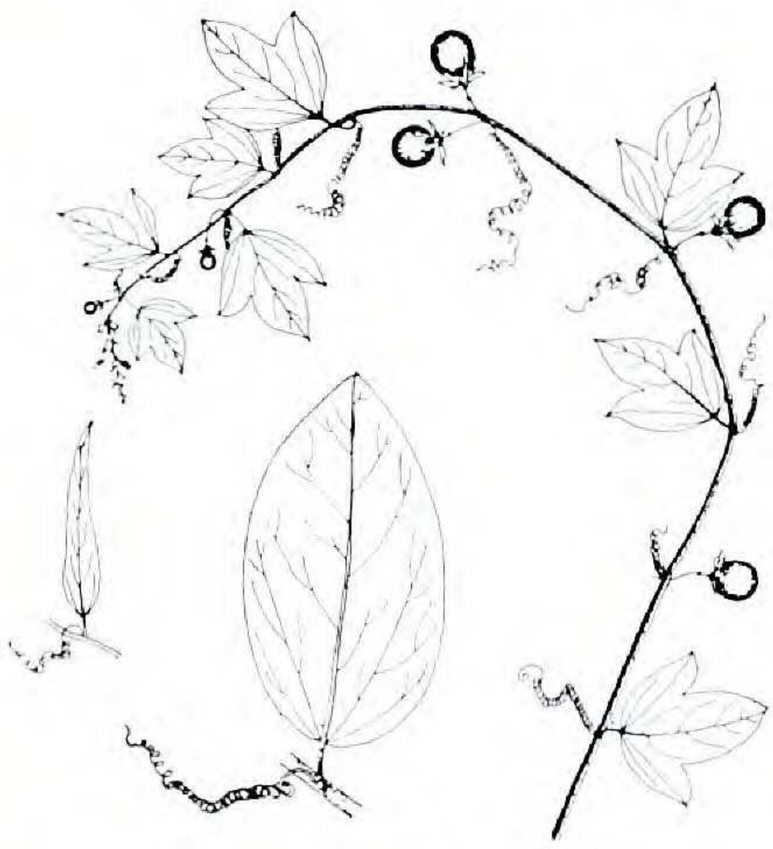
AMPELOPSIS BREVIPEDUNCULATA

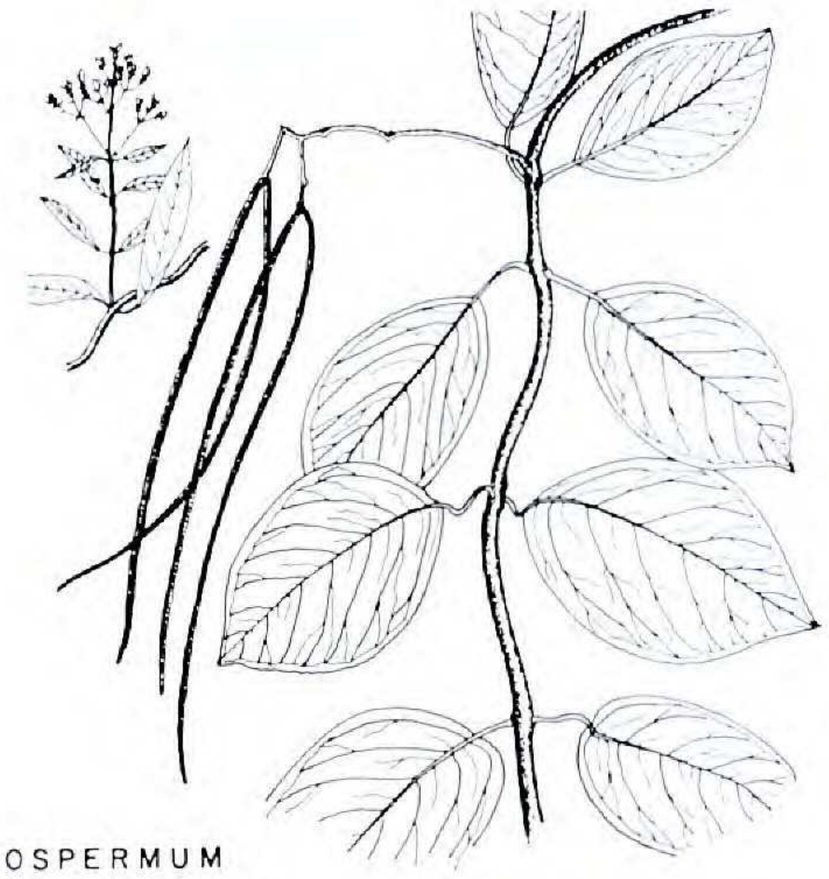


PARTHENOCISSUS QUINQUEFOLIA

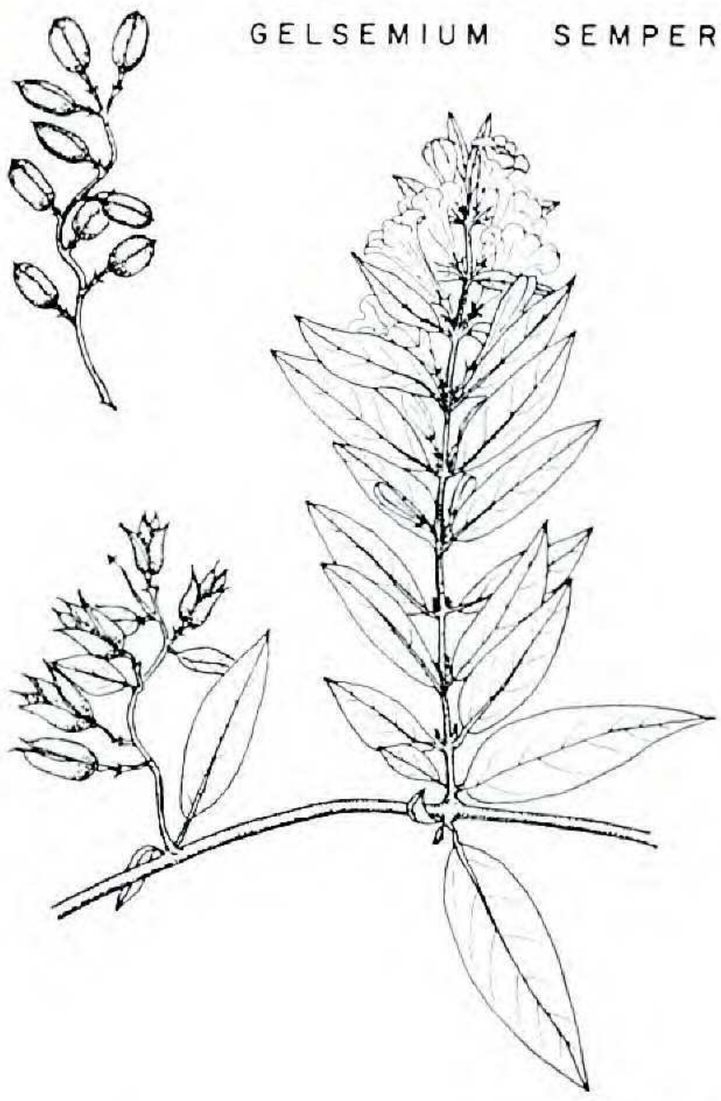


PASSIFLORA PALLIDA

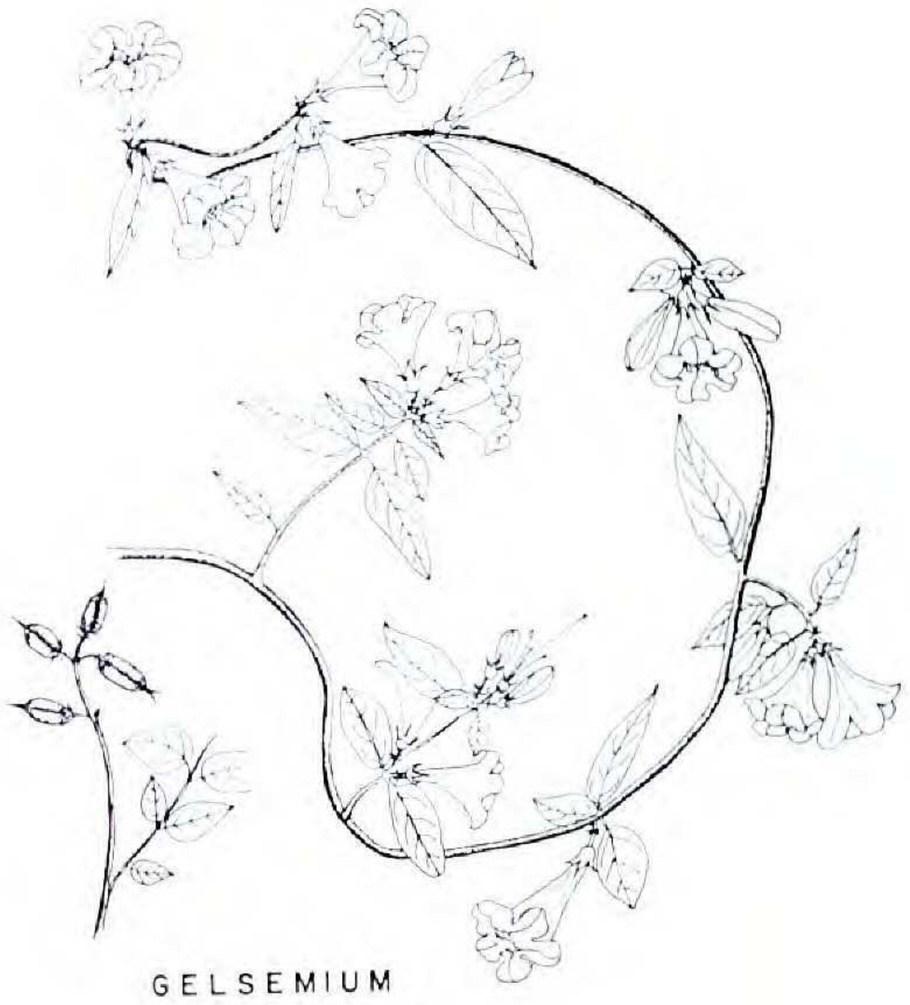




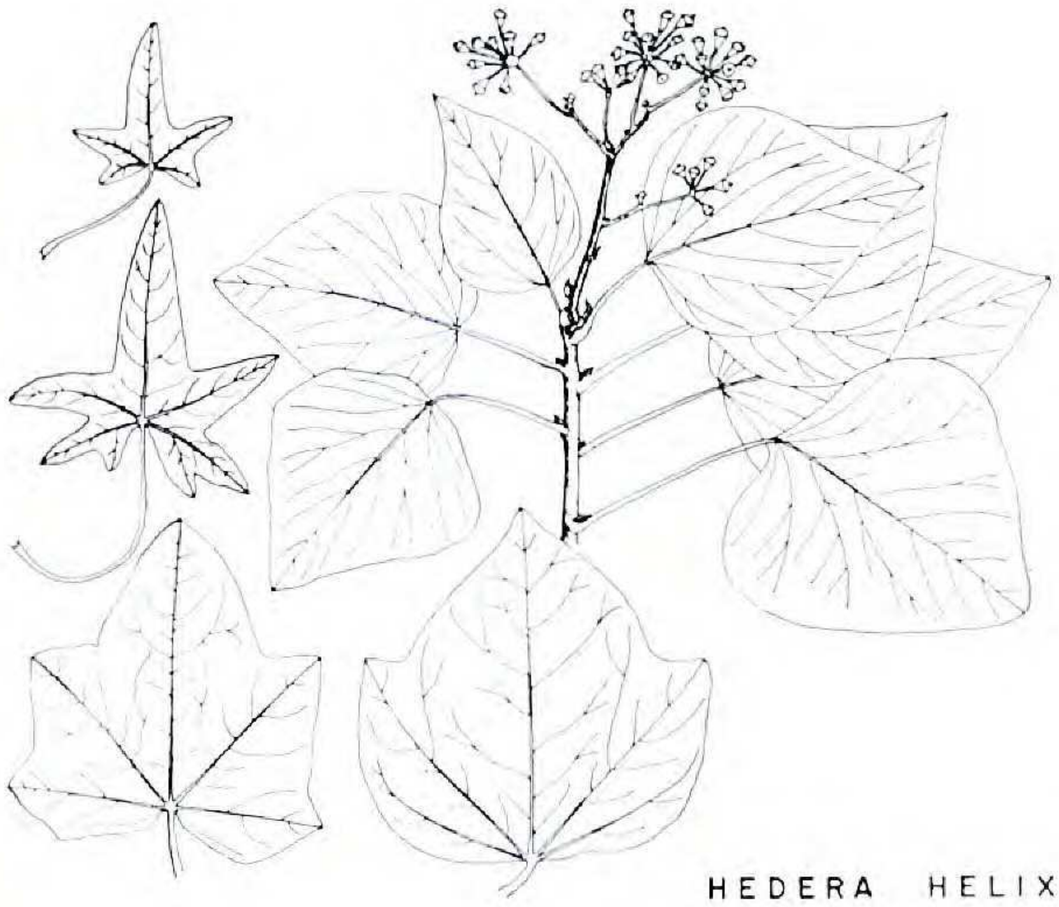
TRACHELOSPERMUM
DIFFORME



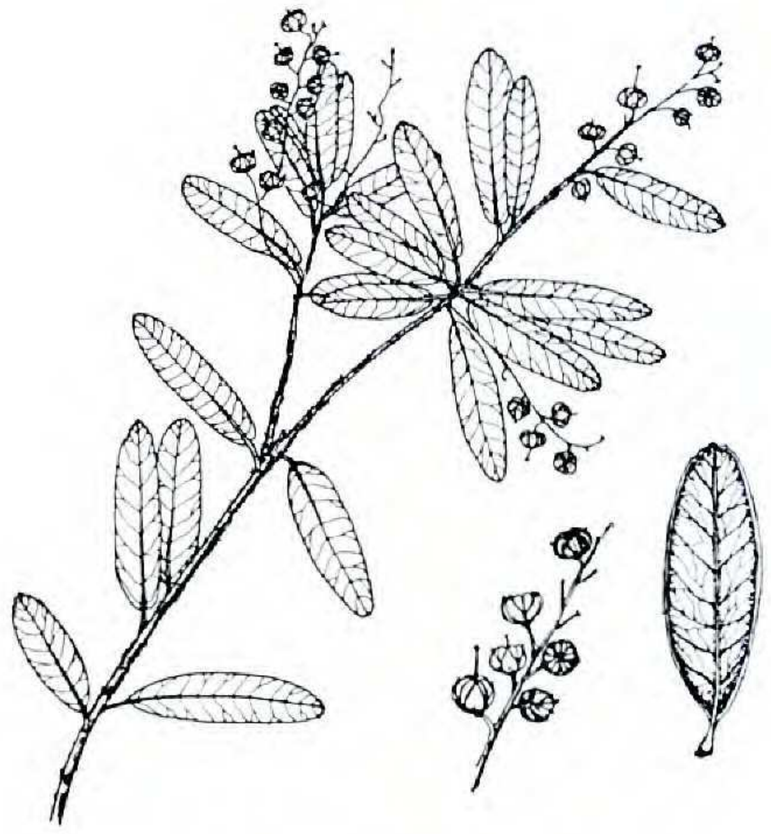
GELSEMIUM SEMPERVIRENS



GELSEMIUM
RANKINII

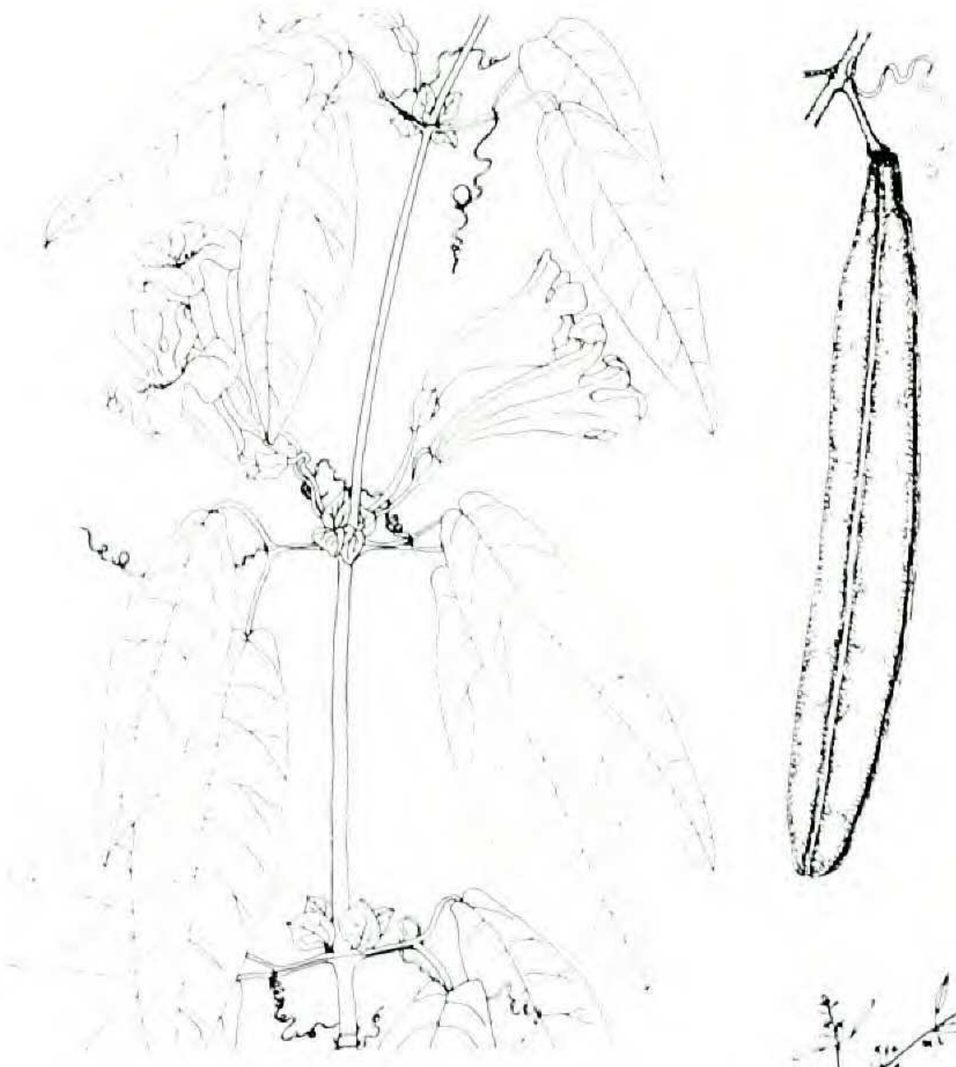


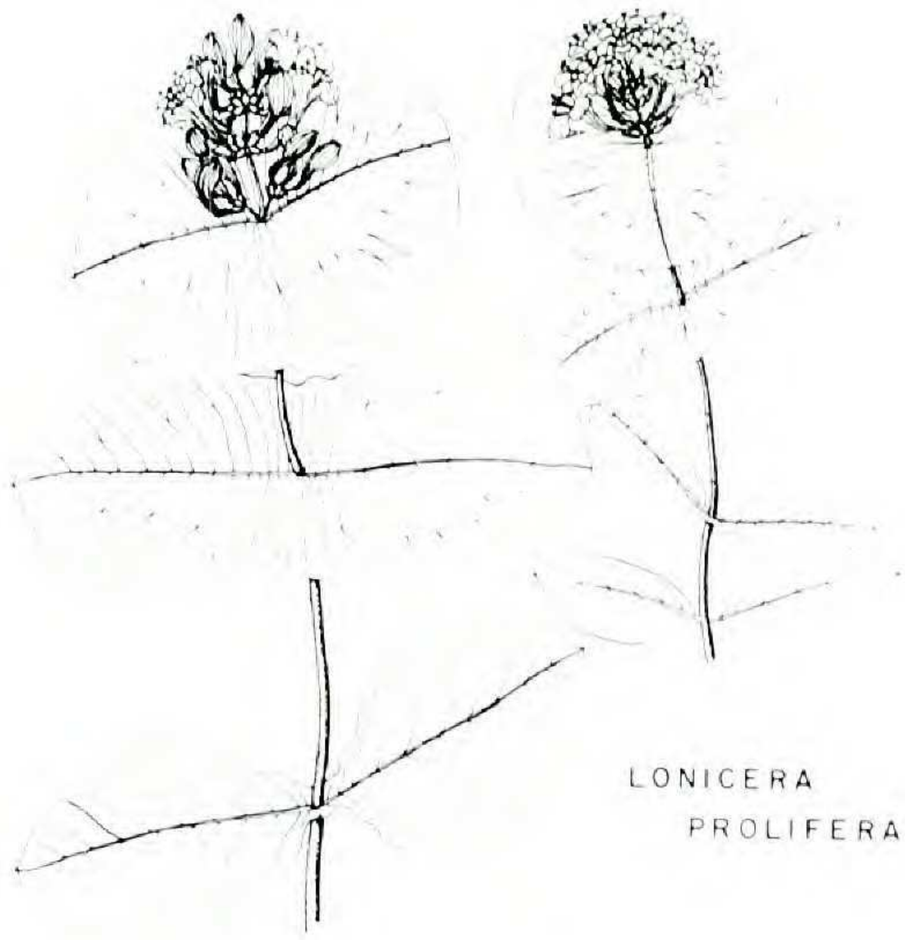
HEDERA HELIX



PIERIS PHILLYREIFOLIA

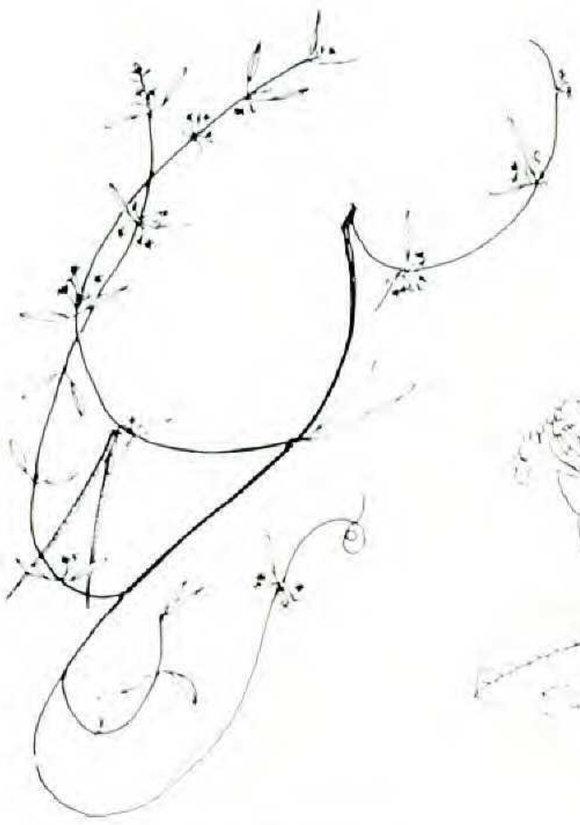
ANISOSTICHUS CAPREOLATA



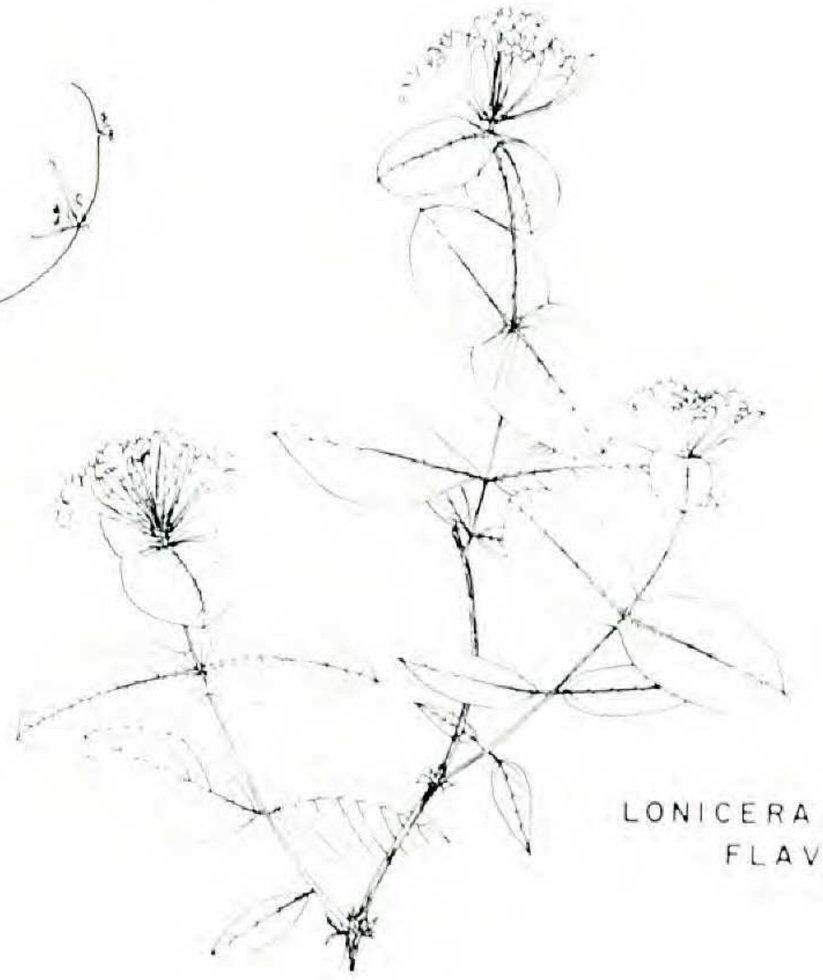


LONICERA
PROLIFERA

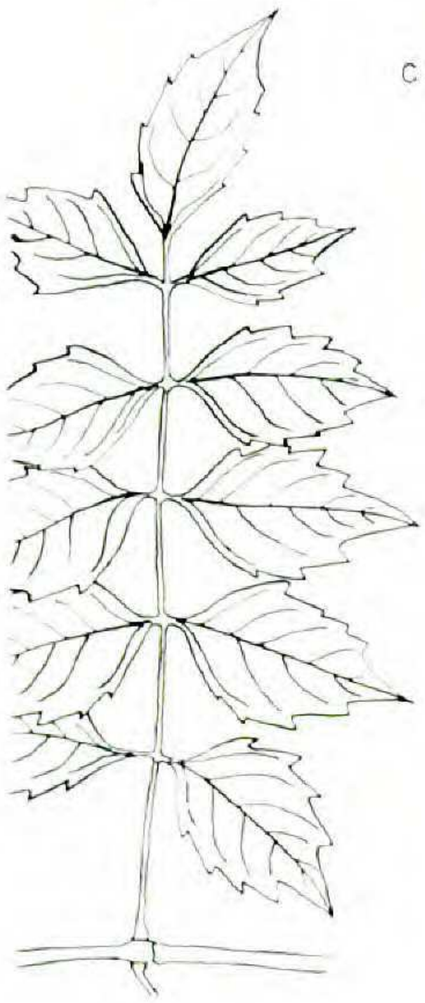
PERIPLOCA
GRAECA



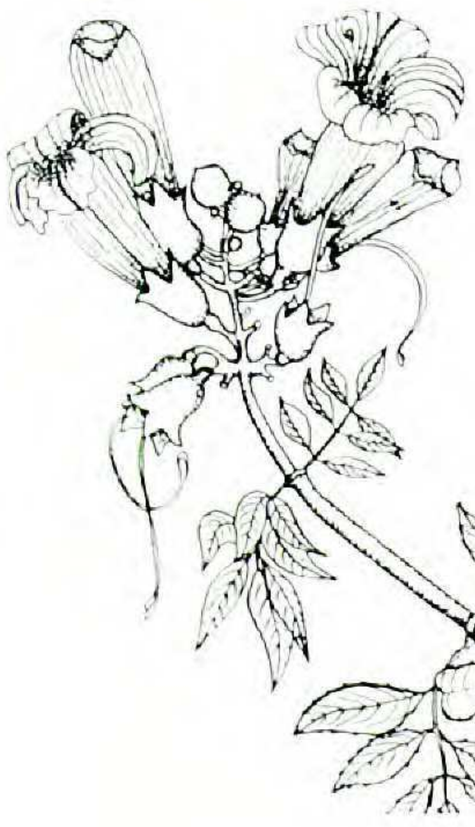
CYNANCHUM SCOPARIUM

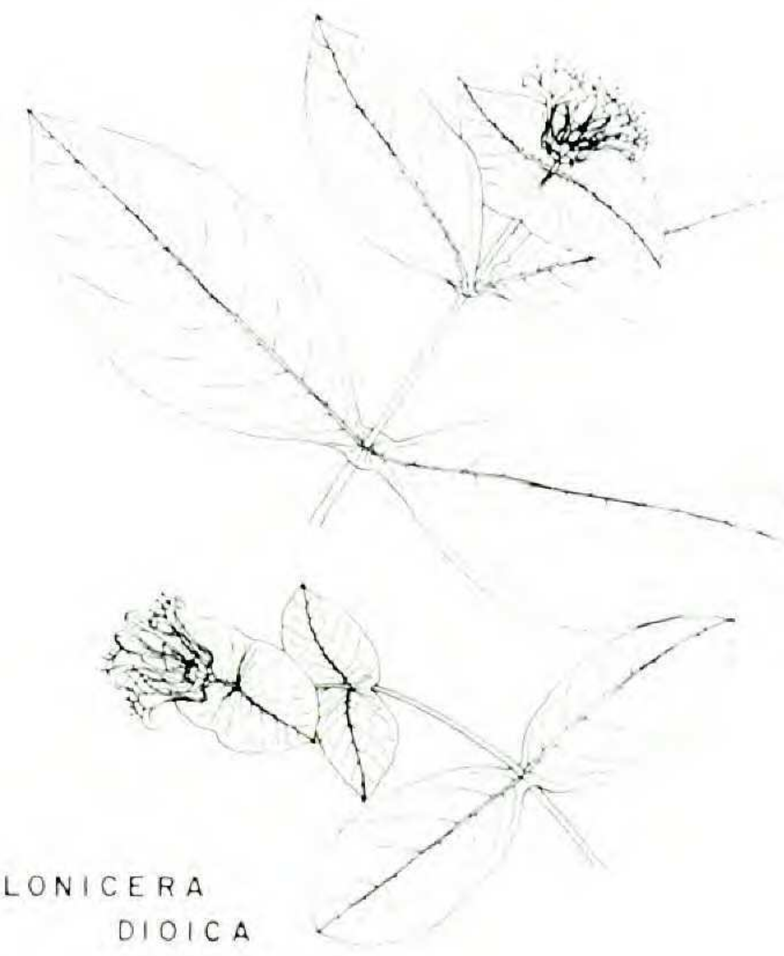


LONICERA
FLAVA



CAMPSIS RADICANS



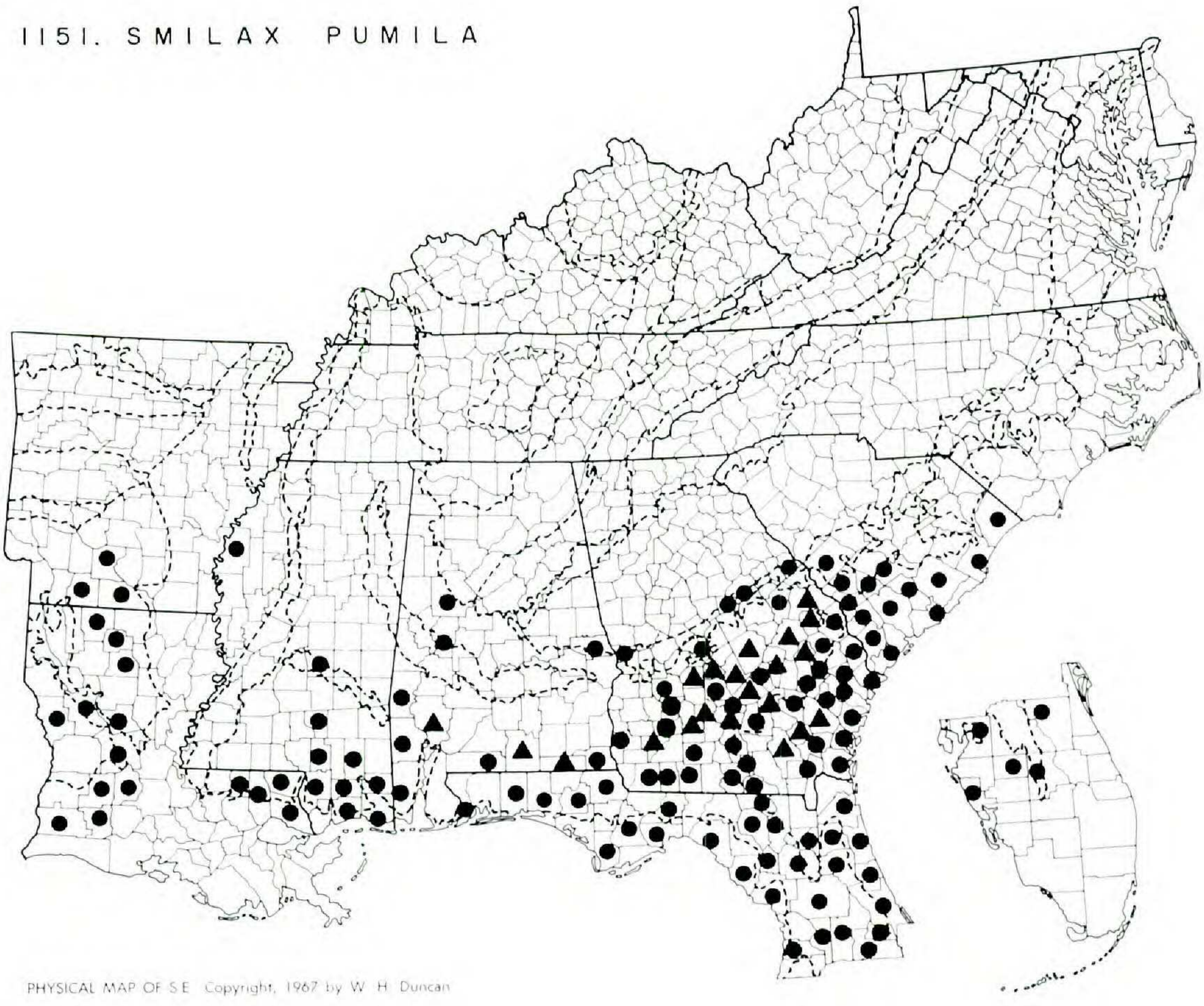


LONICERA
DIOICA

LONICERA JAPONICA

LONICERA SEMPERVIRENS

1151. SMILAX PUMILA



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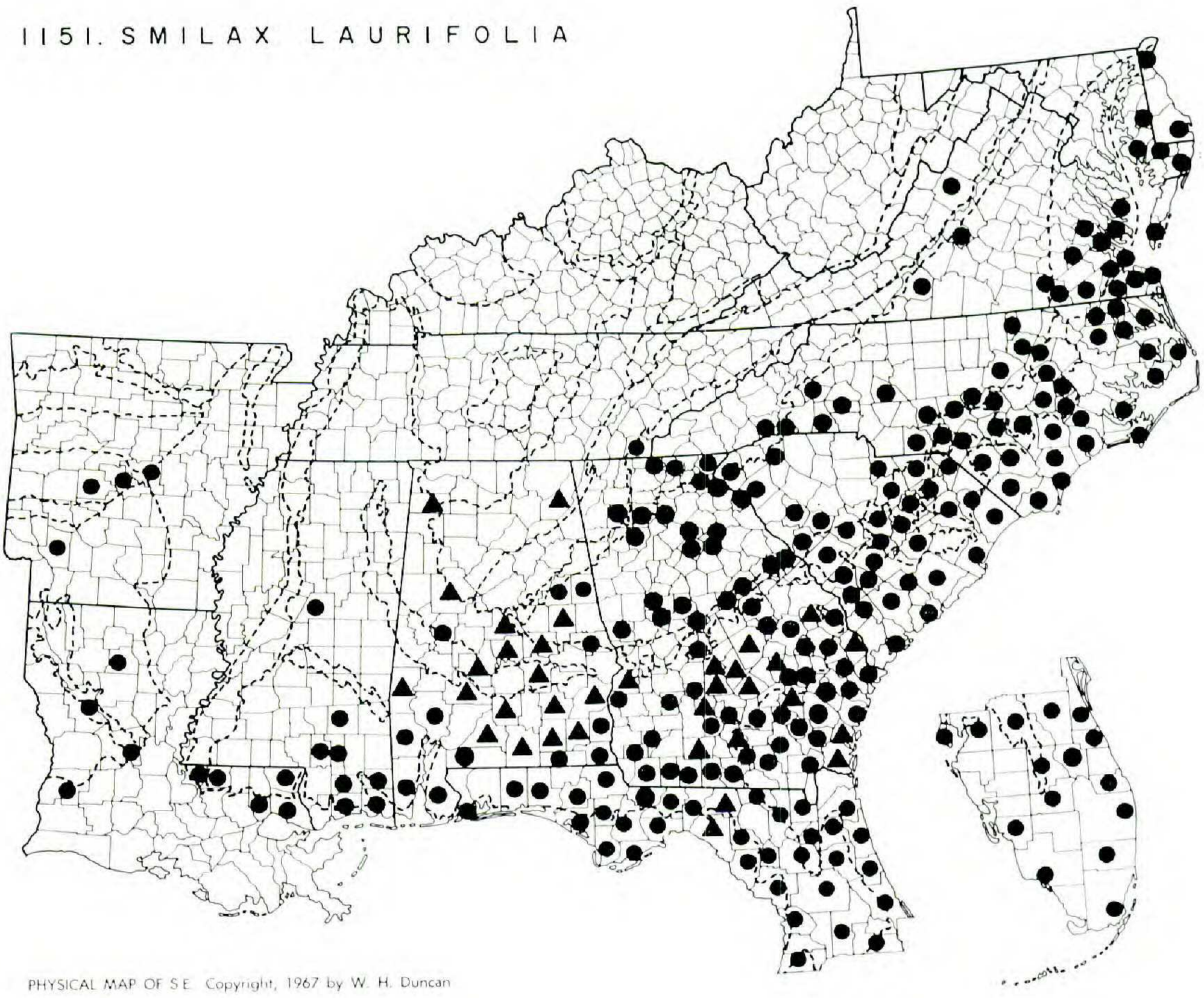
1151. SMILAX LAURIFOLIA



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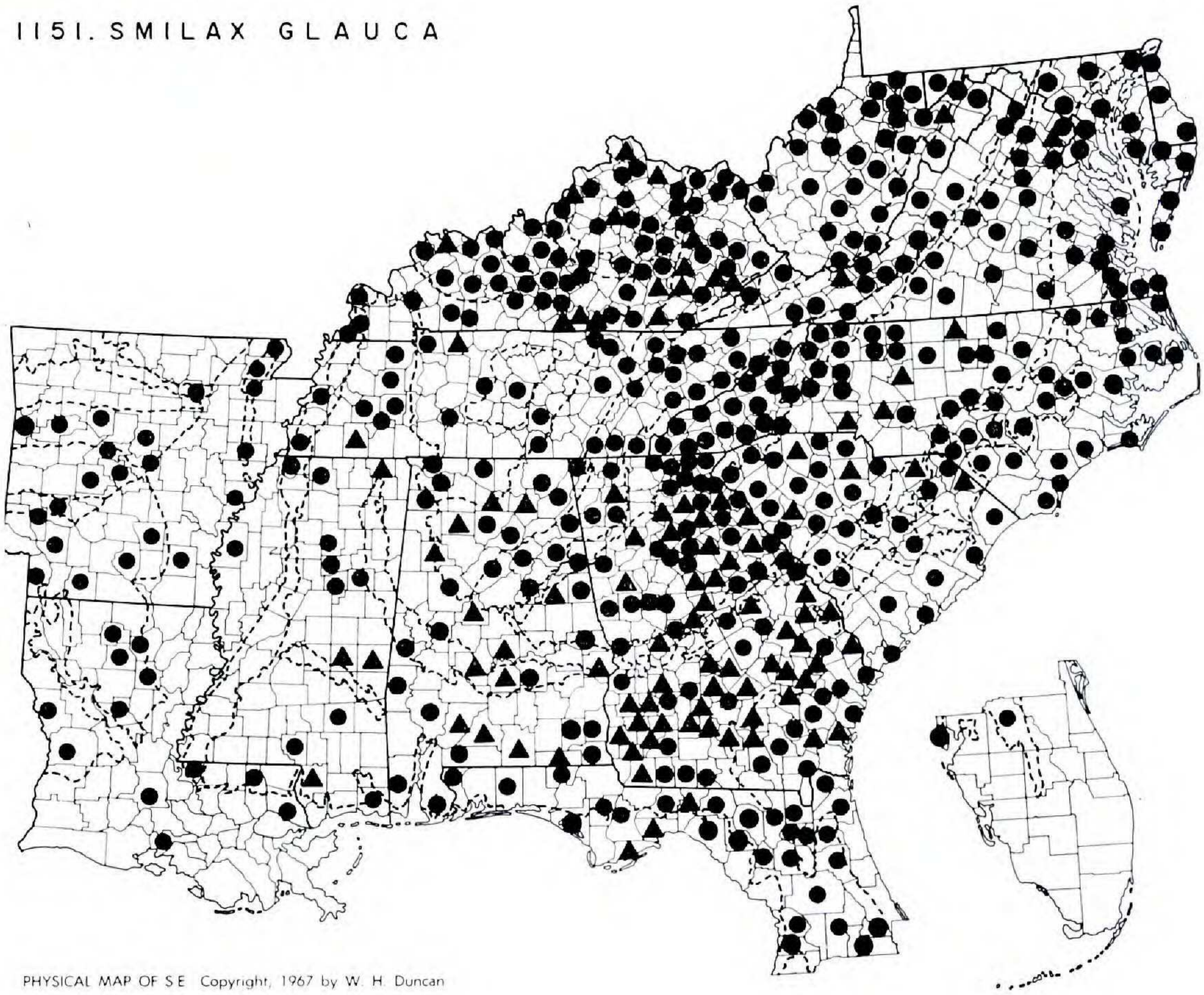
1151. SMILAX GLAUCA



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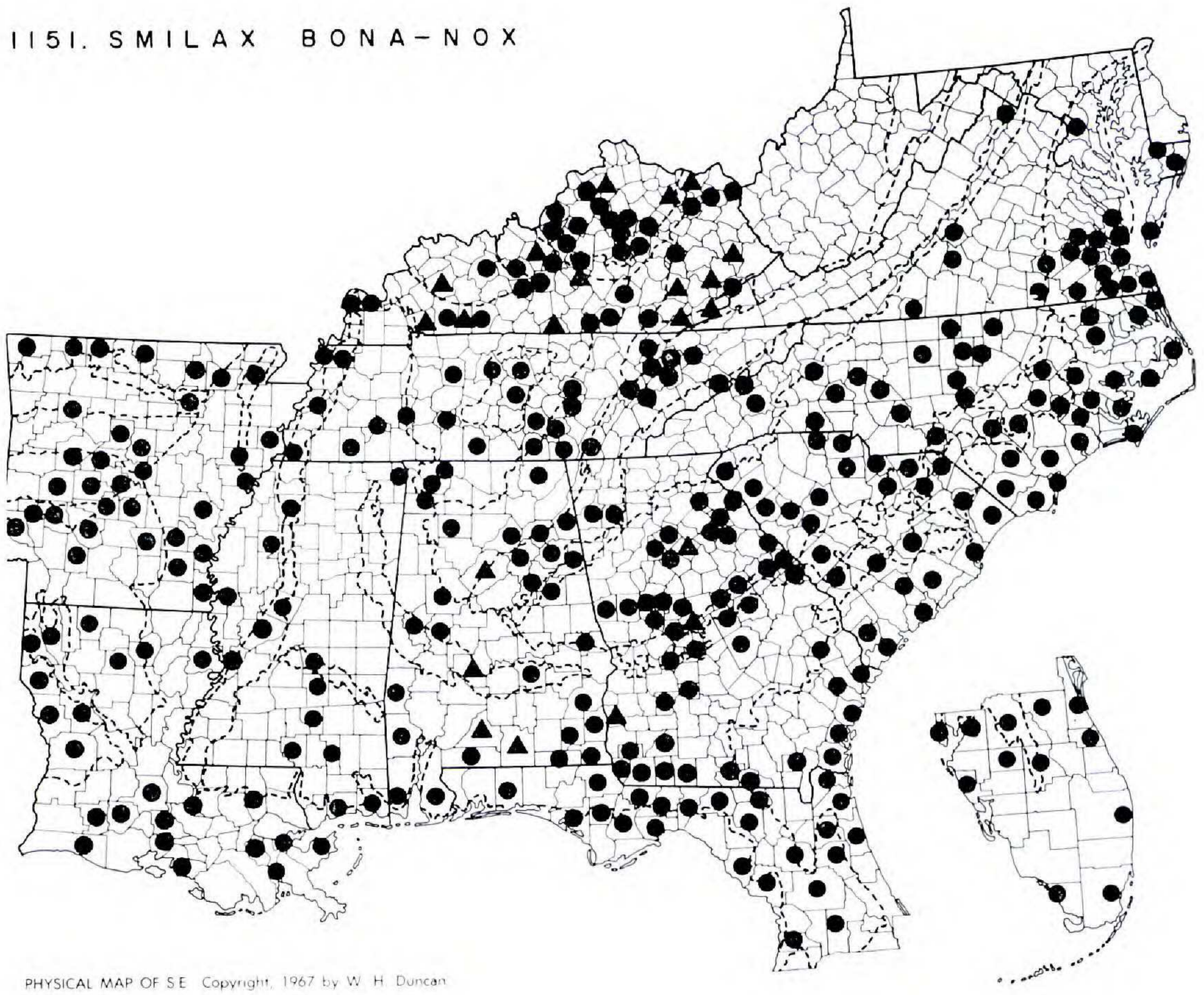
1151. SMILAX BONA-NOX



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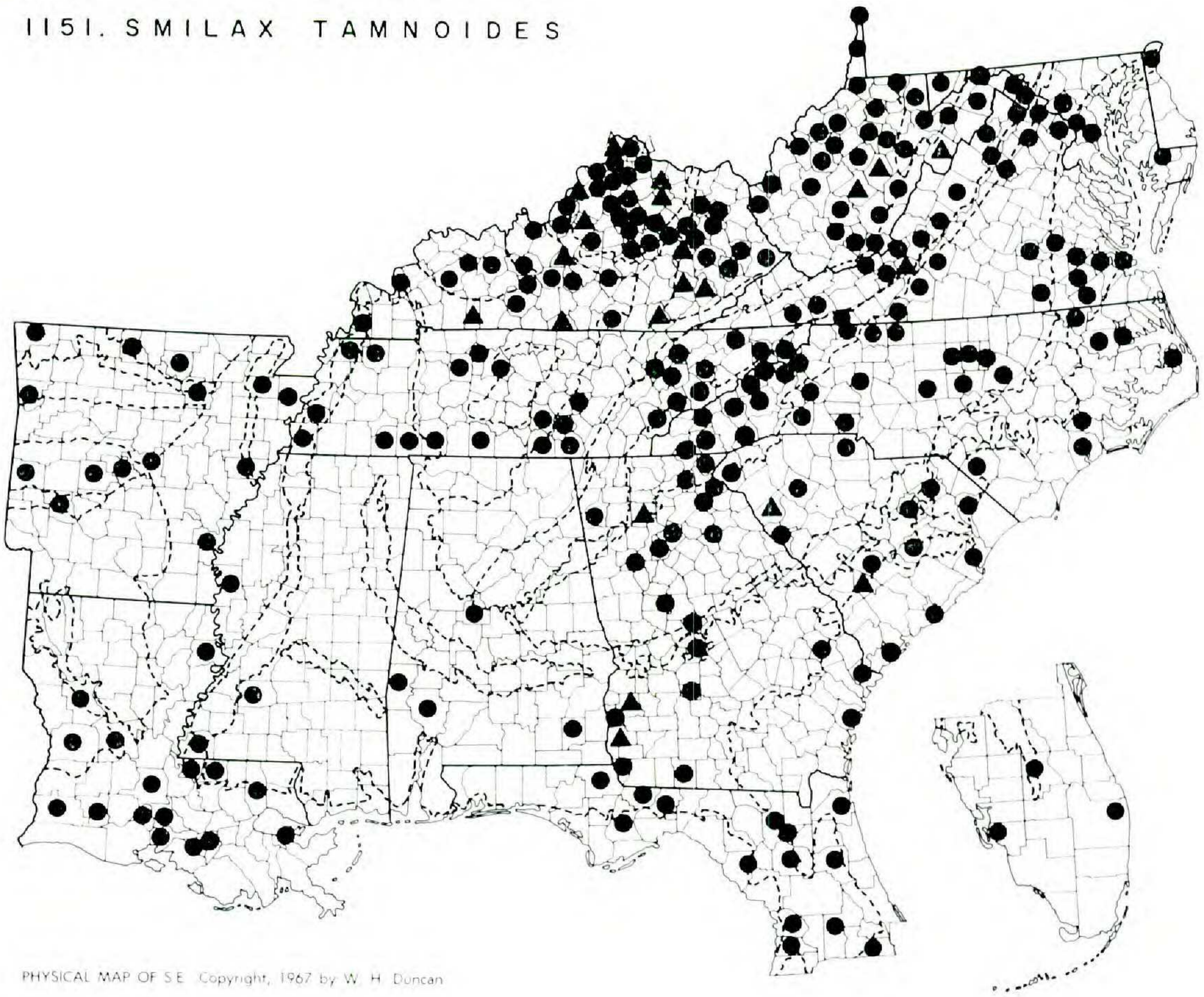
1151. SMILAX TAMNOIDES



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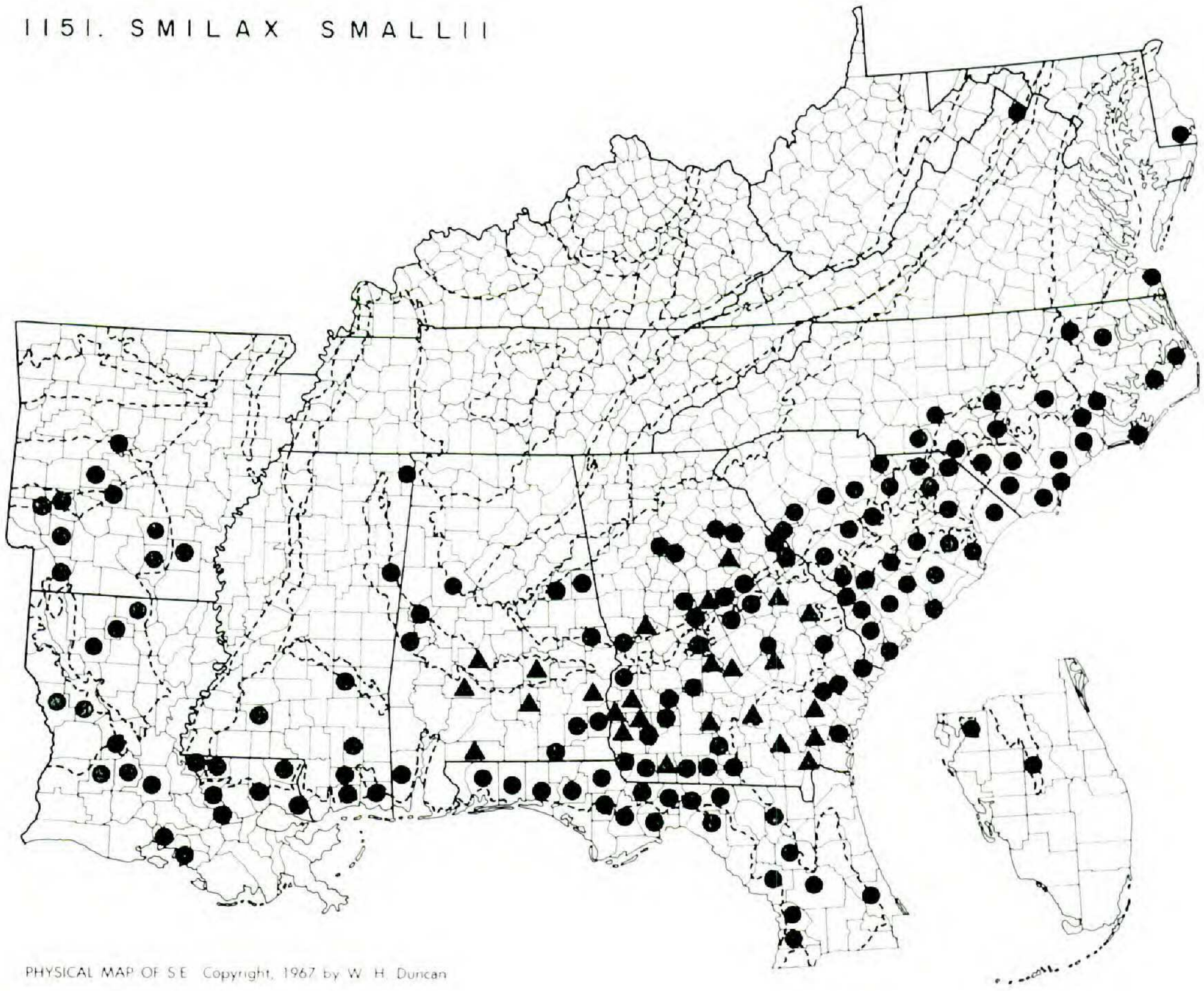
1151. SMILAX SMALLII



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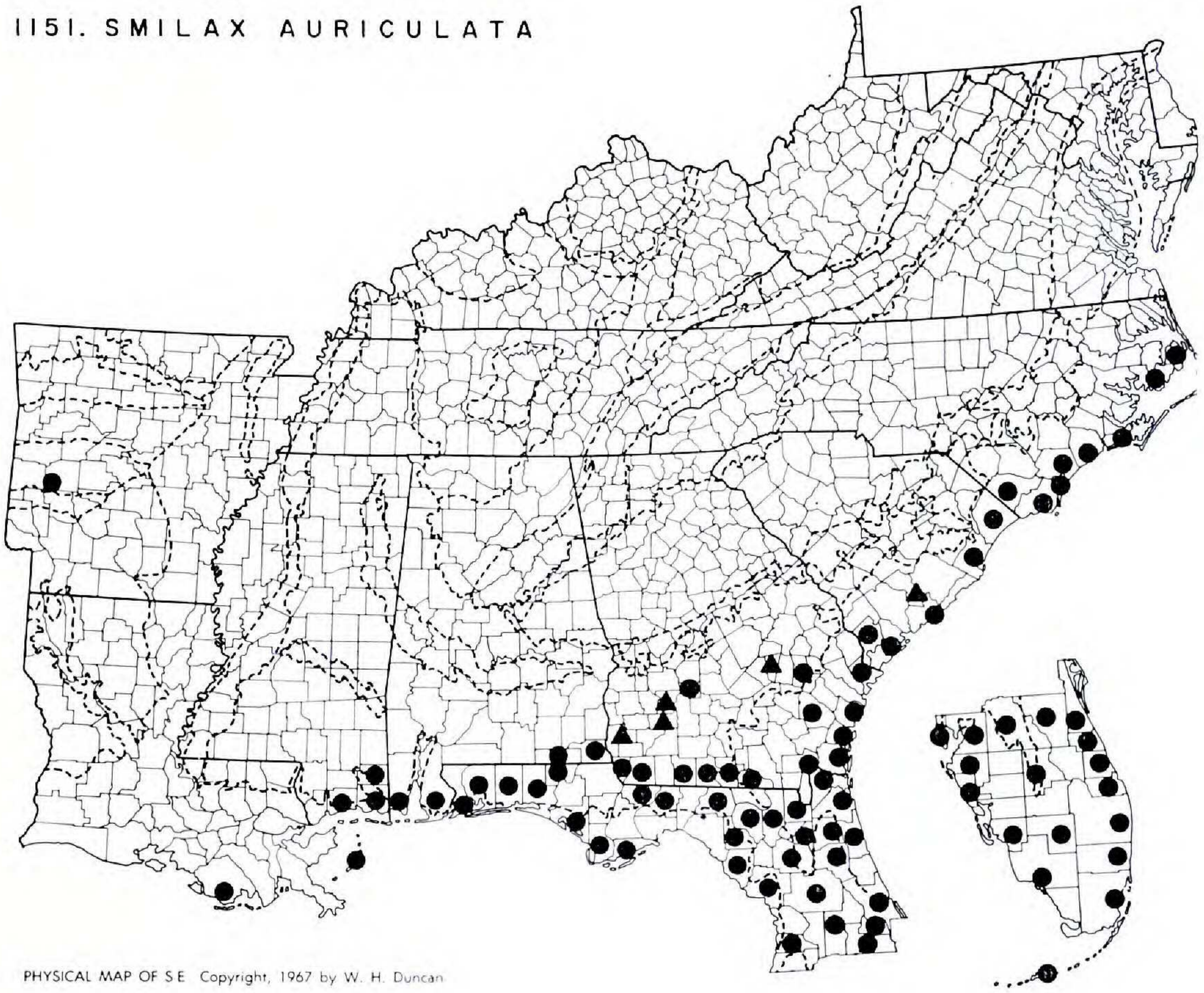
1151. SMILAX AURICULATA



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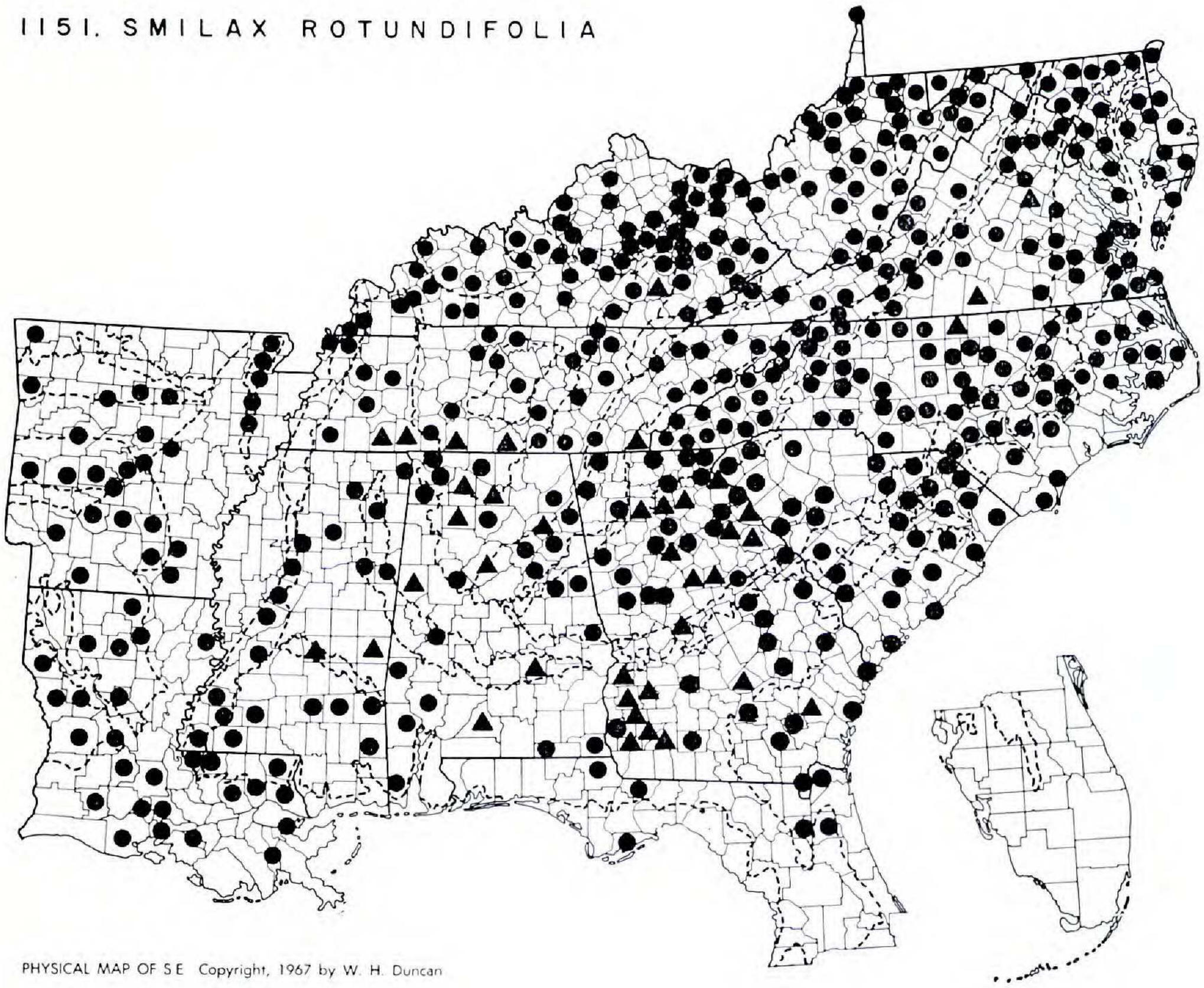
1151. SMILAX ROTUNDIFOLIA



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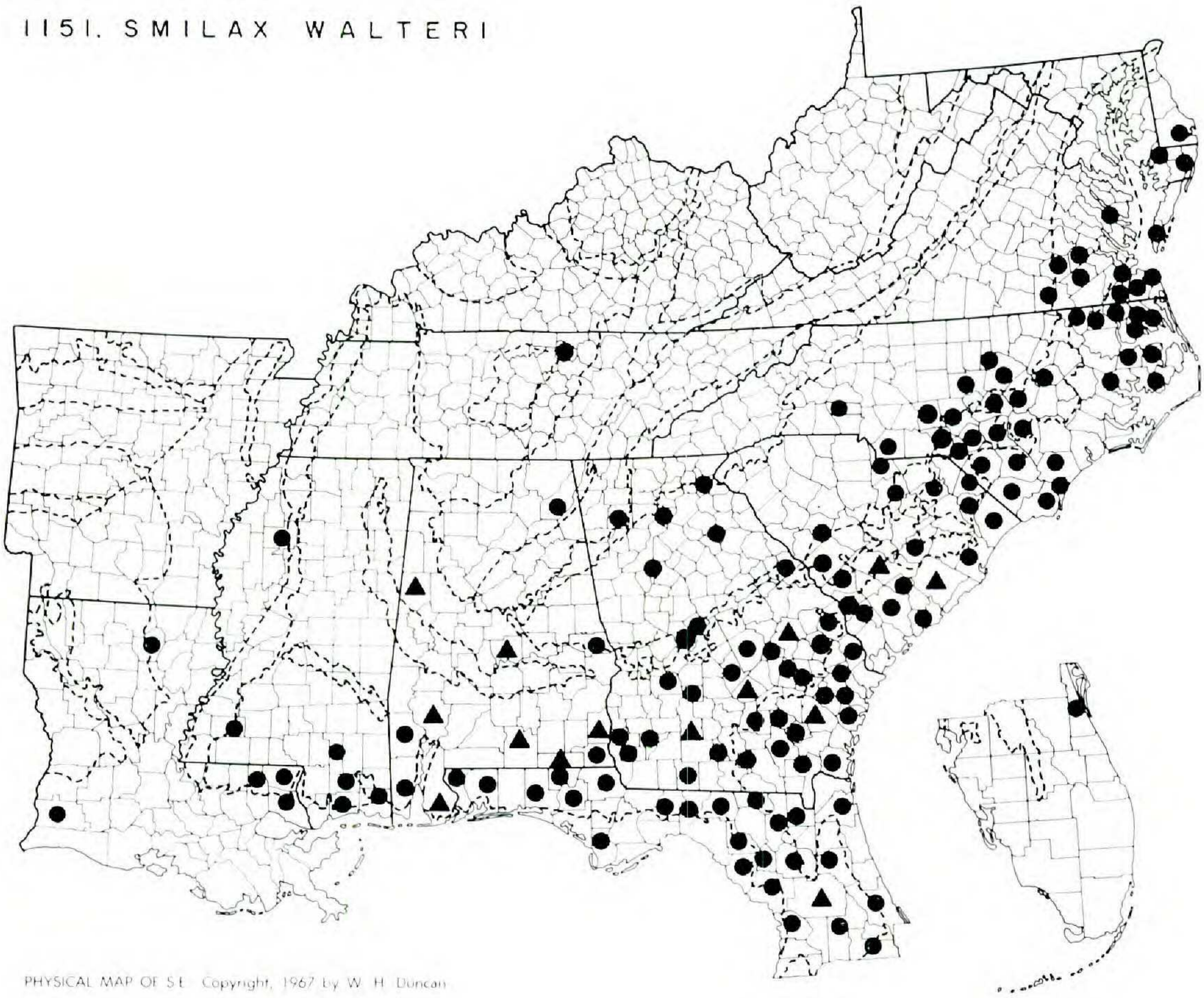
1151. SMILAX WALTERI



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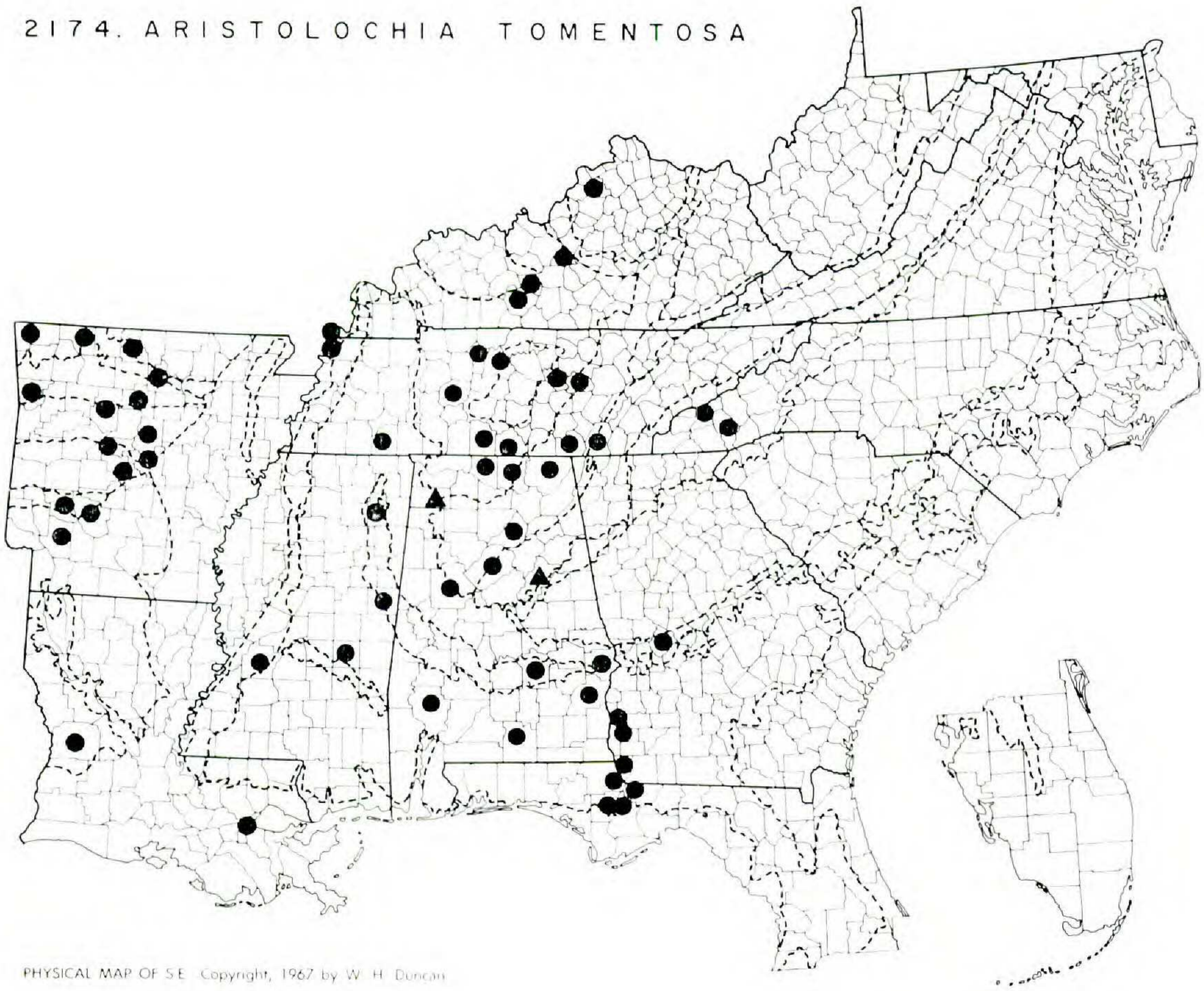
2174. ARISTOLOCHIA TOMENTOSA



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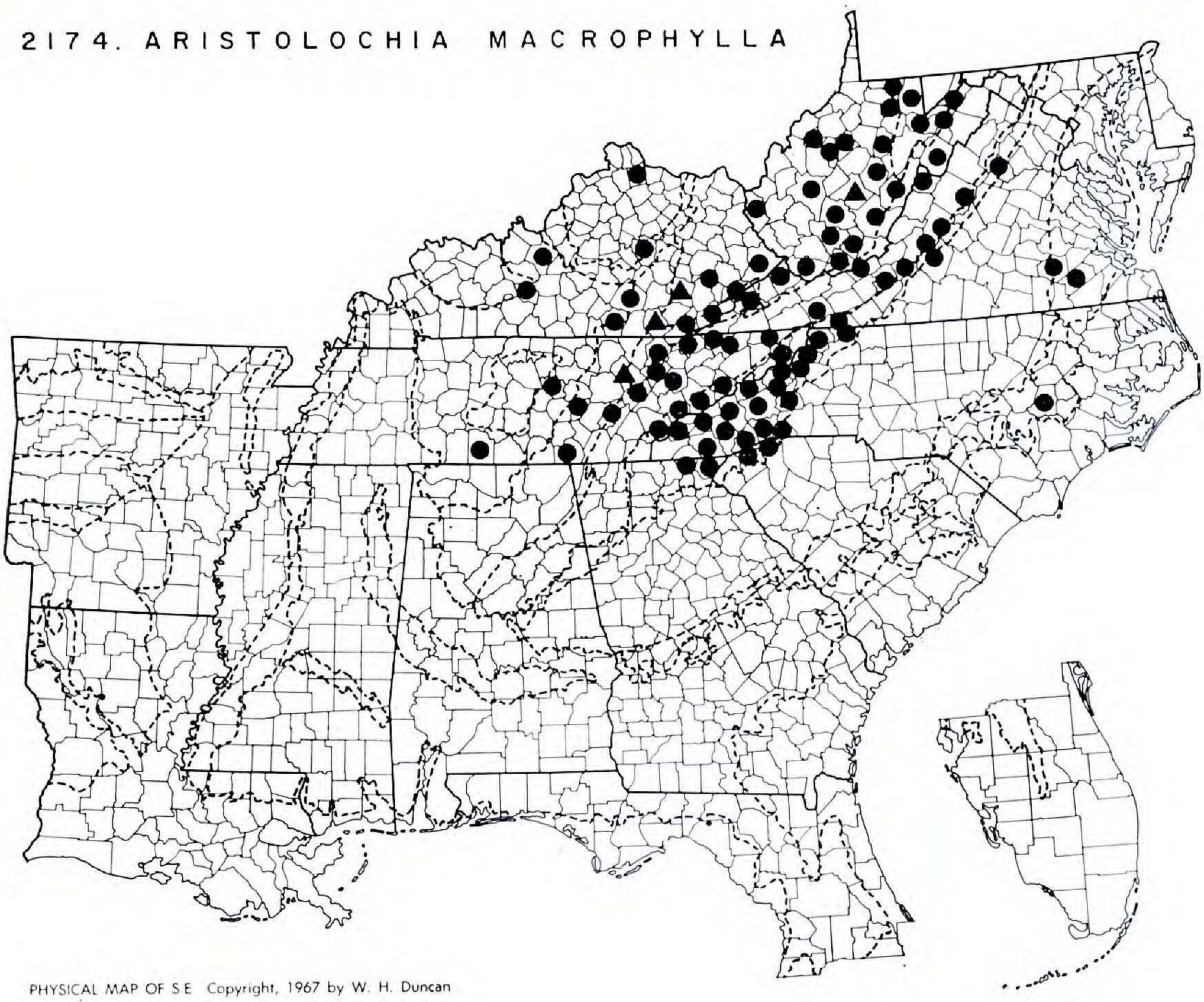
2174. ARISTOLOCHIA MACROPHYLLA



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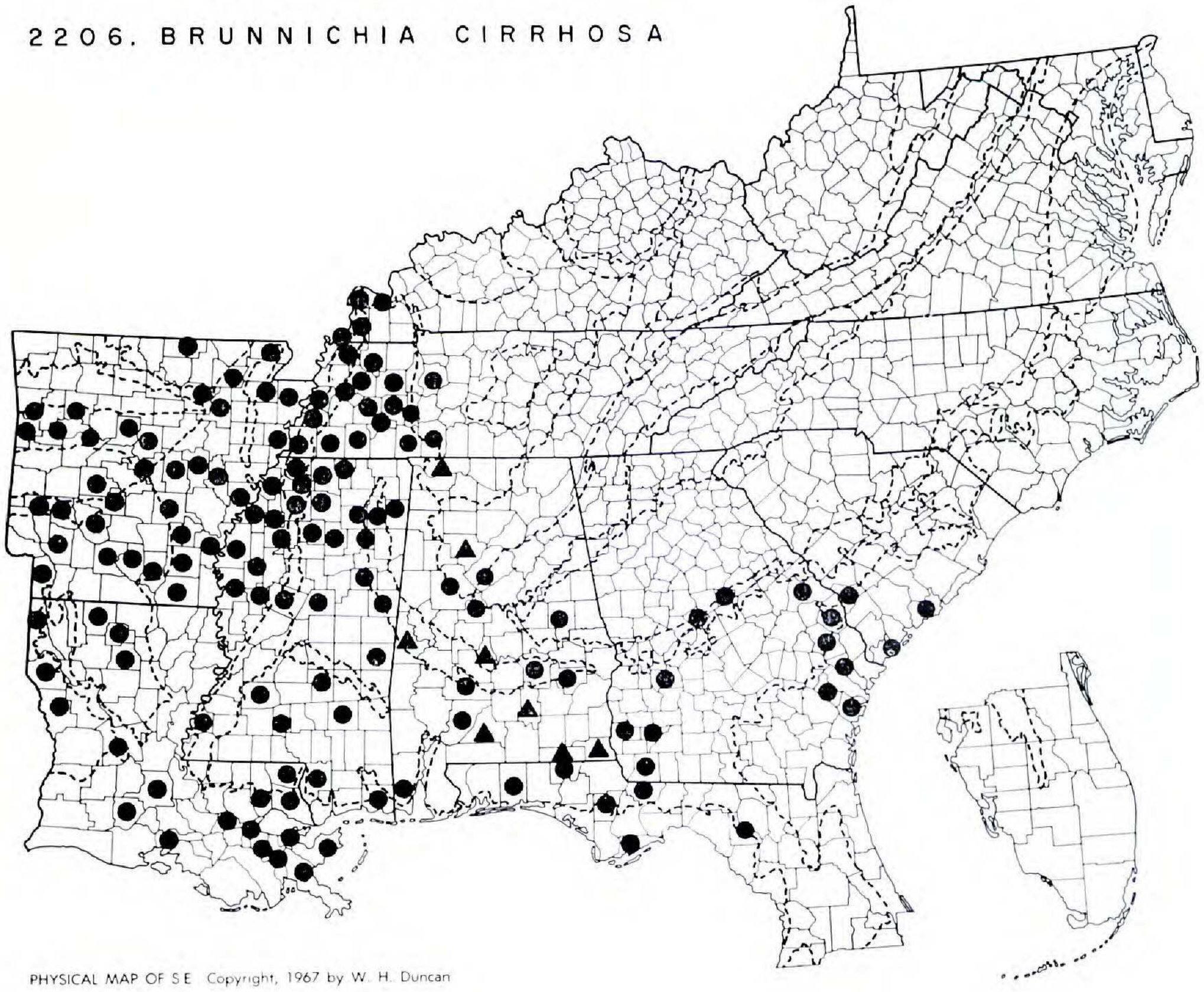
2206. BRUNNICHIA CIRRHOSA



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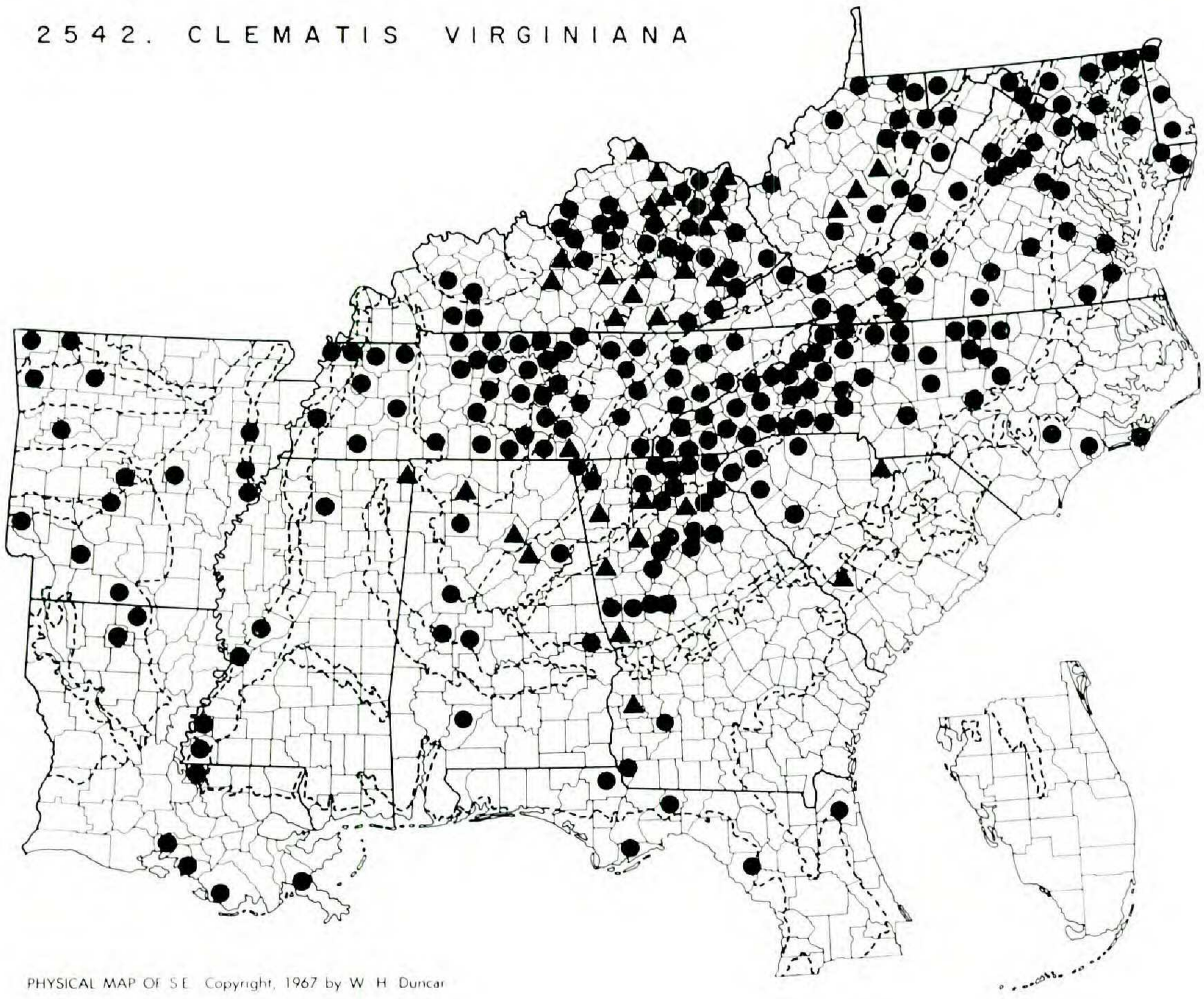
2542. CLEMATIS VIRGINIANA



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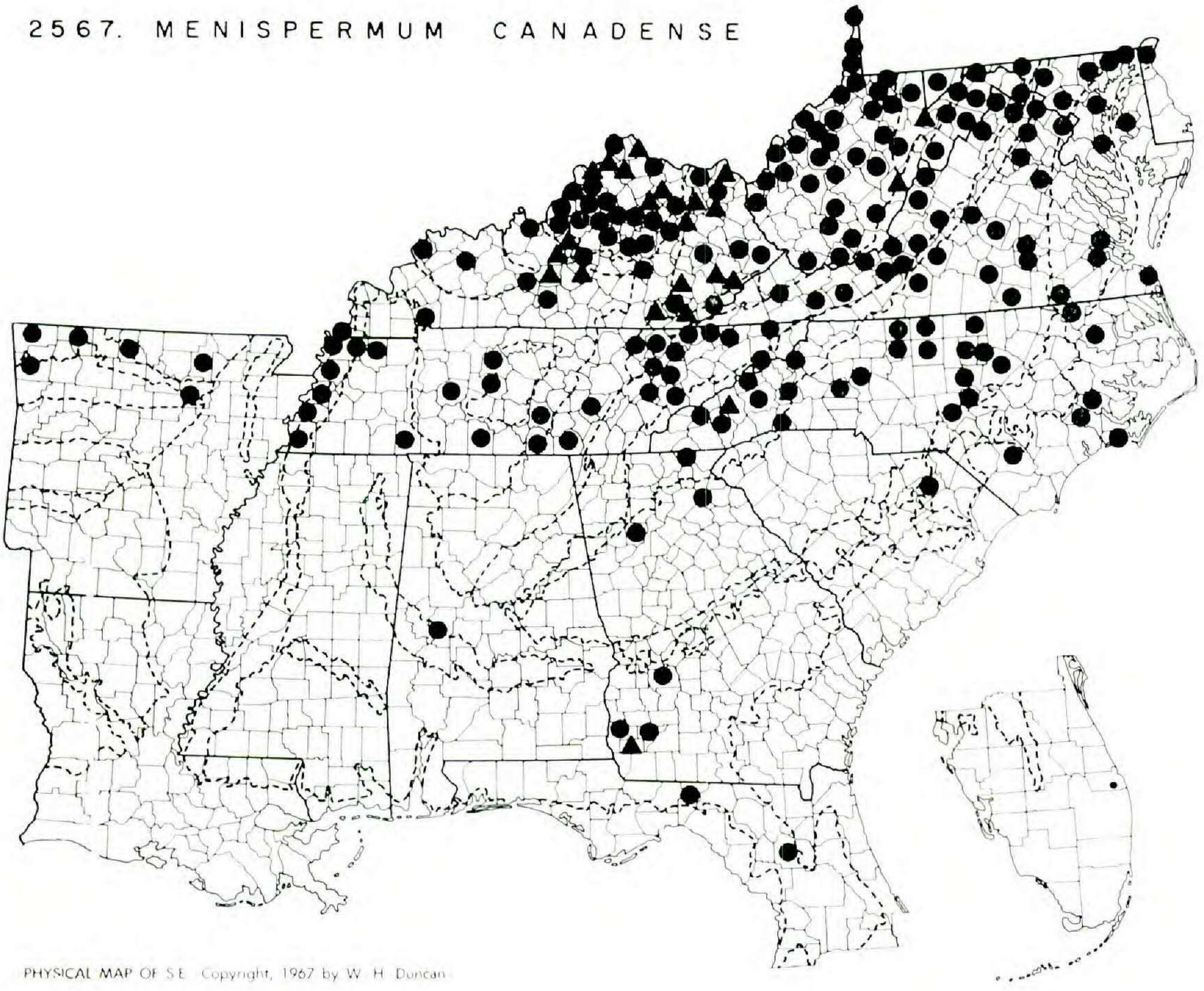
2567. MENISPERMUM CANADENSE



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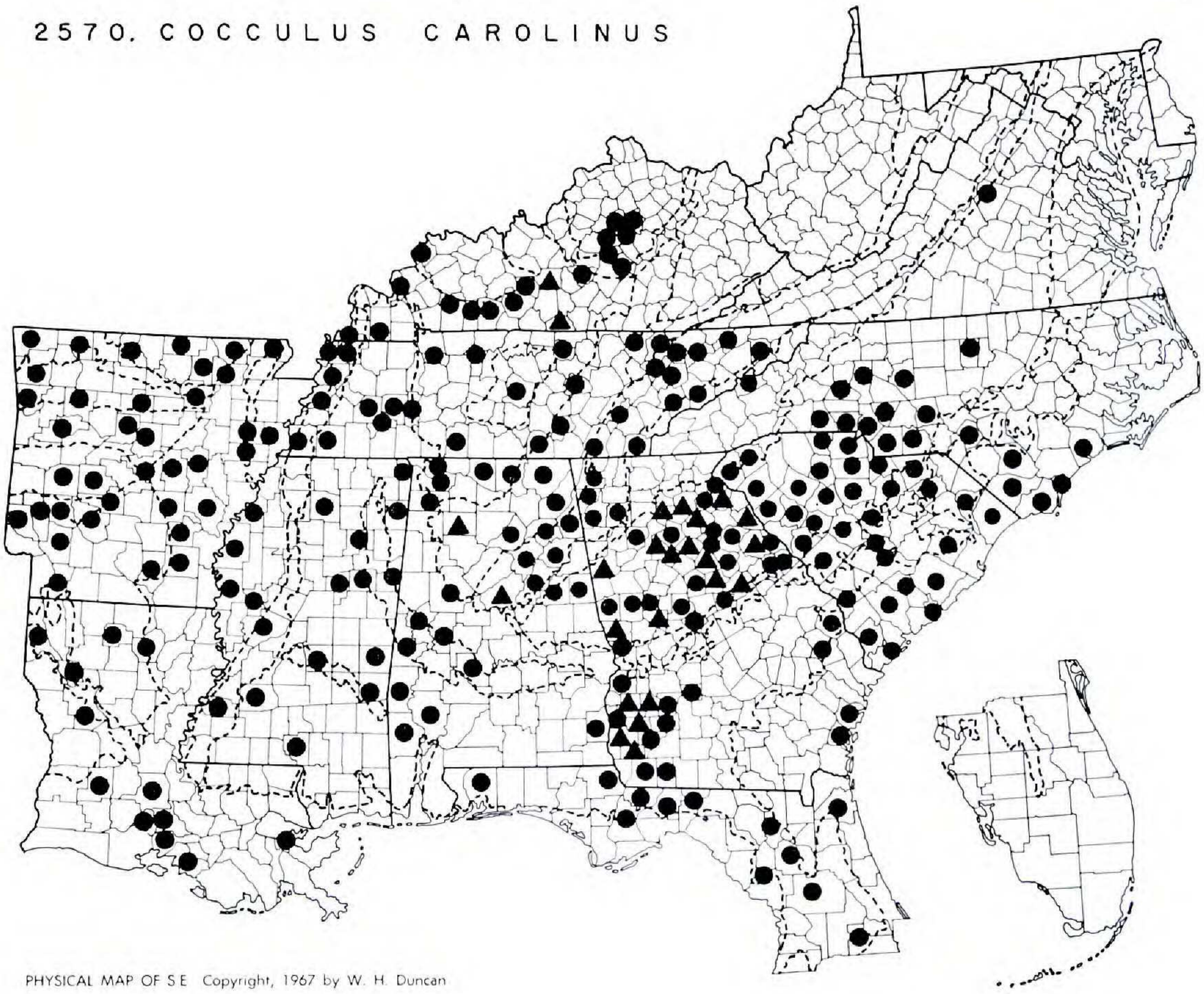
2570. COCCULUS CAROLINUS



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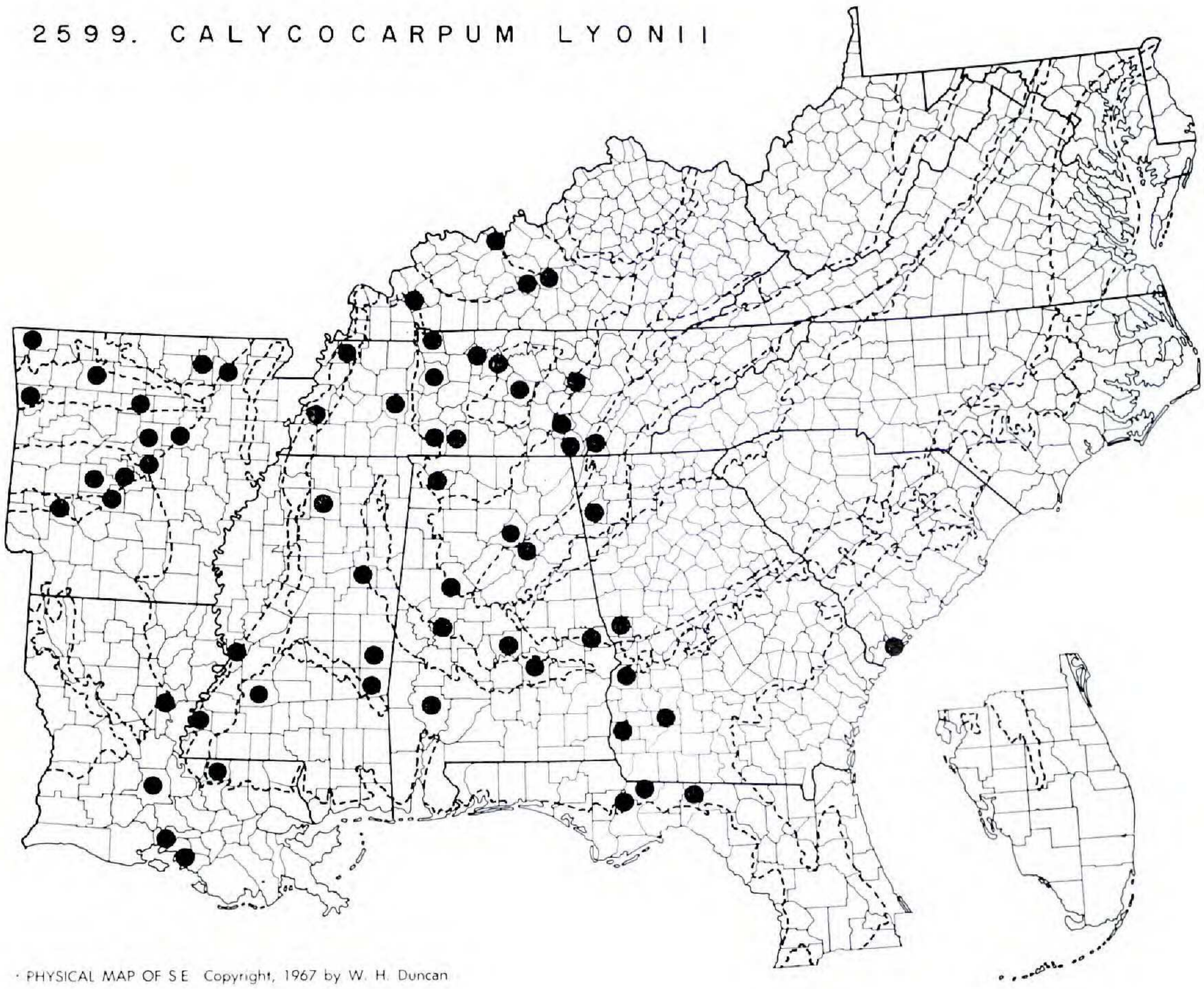
2599. CALYCOCARPUM LYONII



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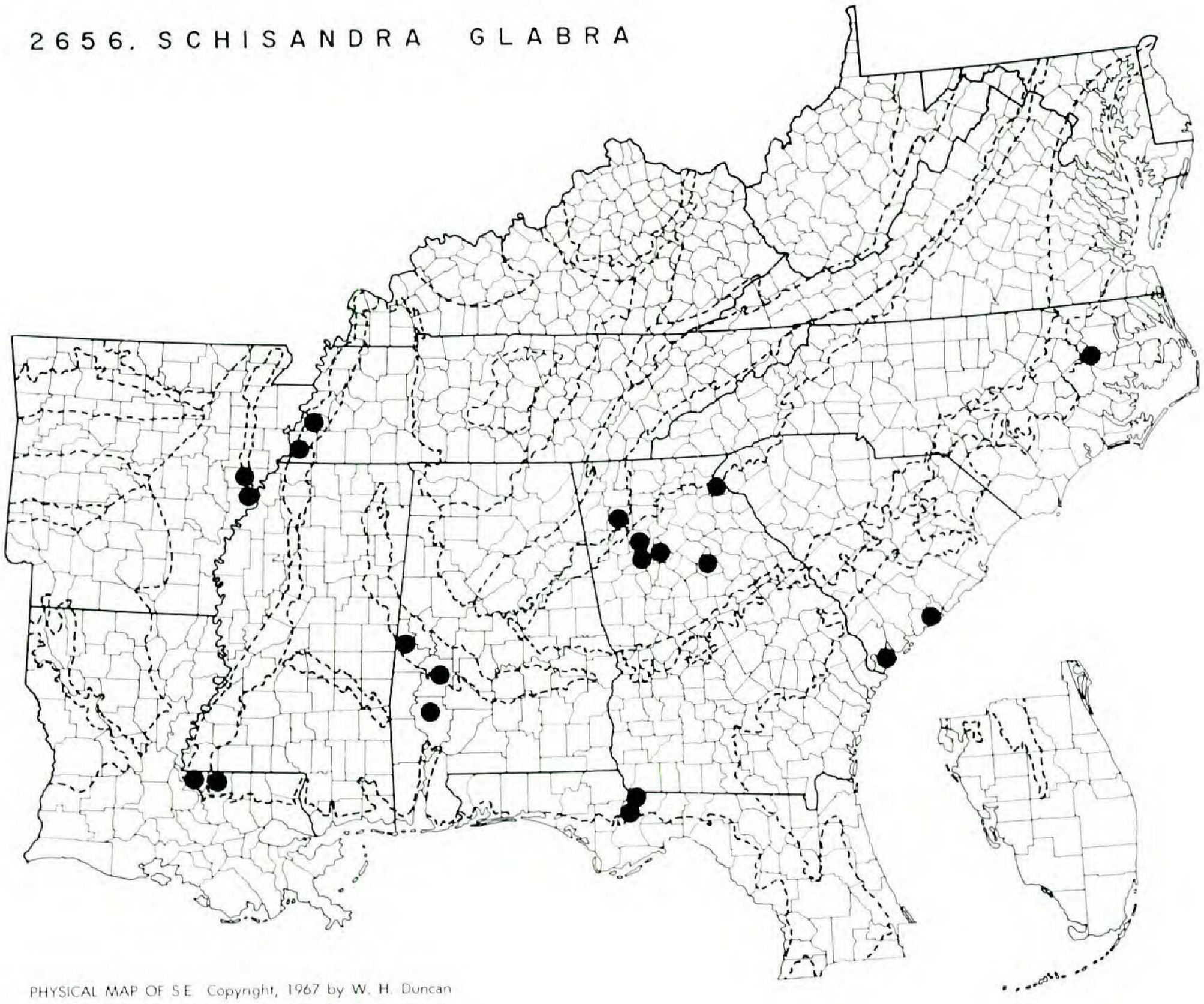
2656. SCHISANDRA GLABRA



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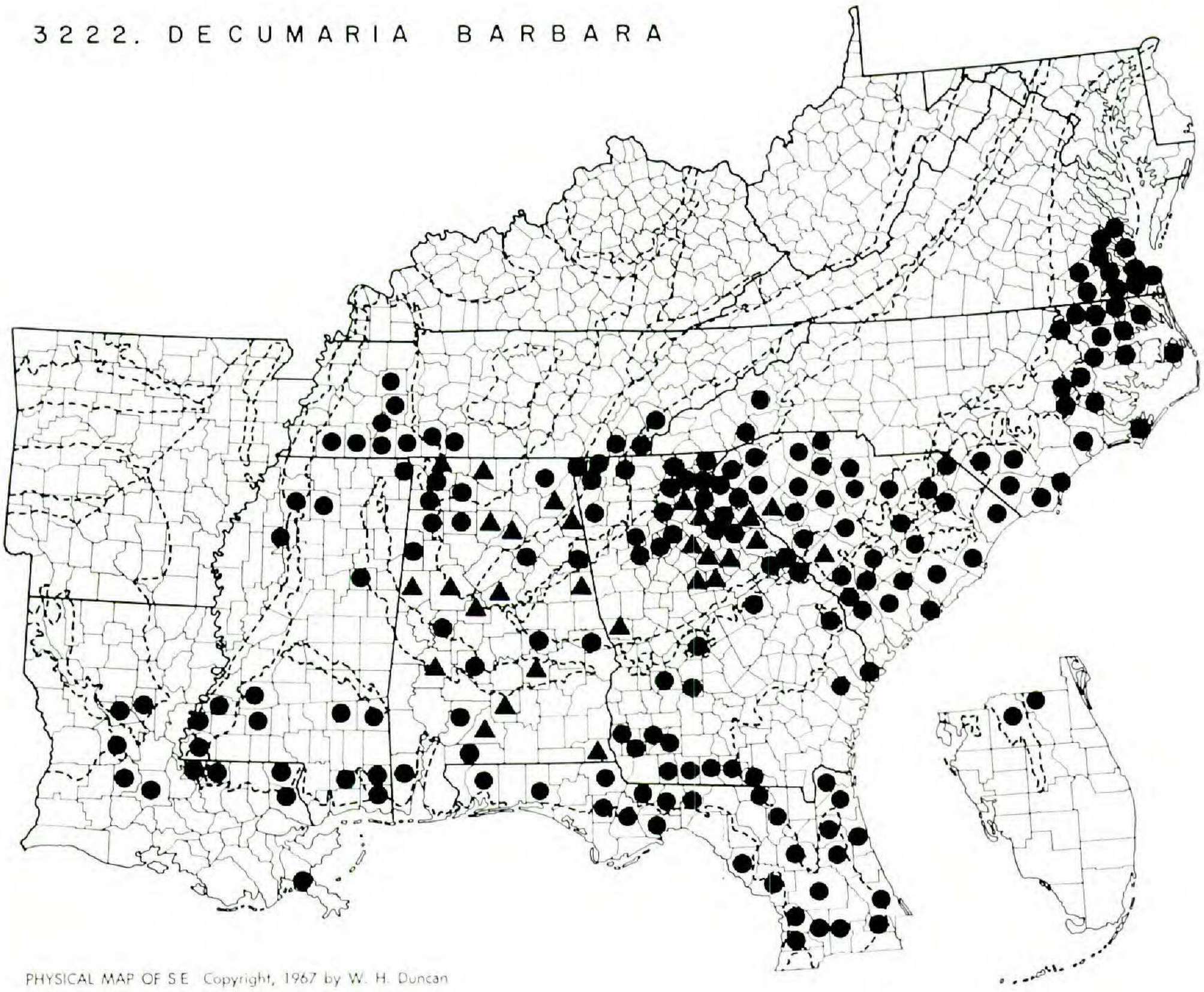

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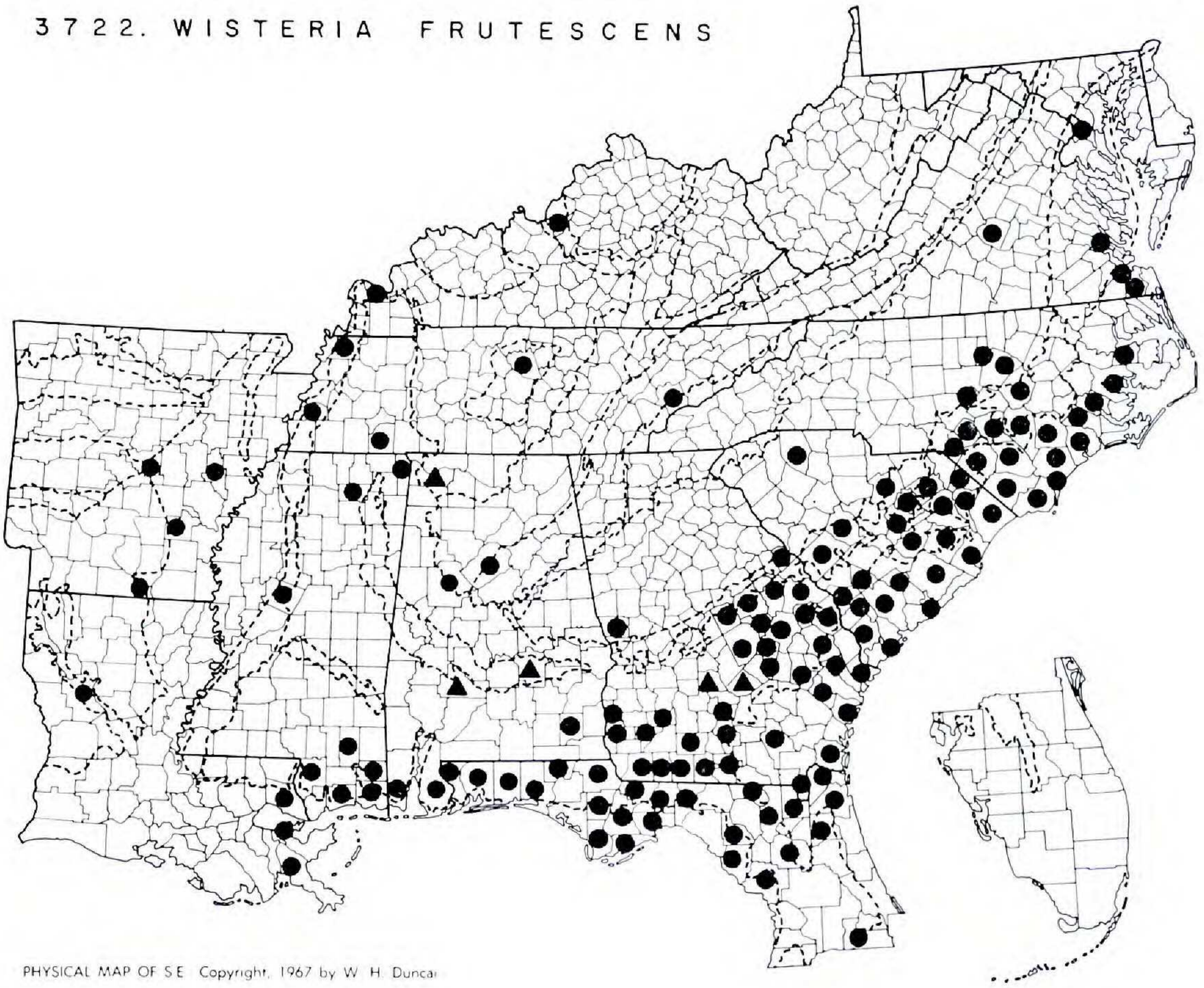

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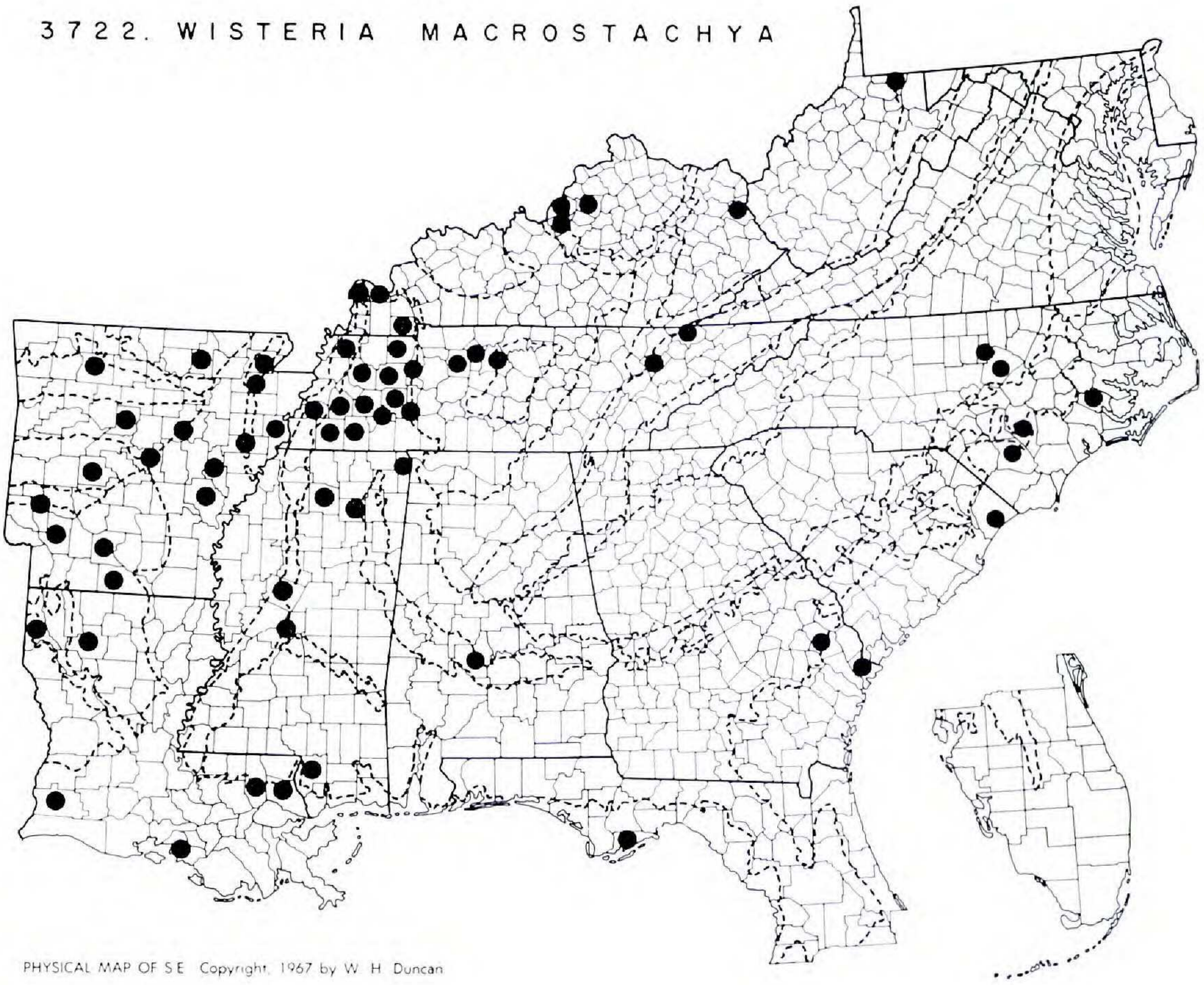

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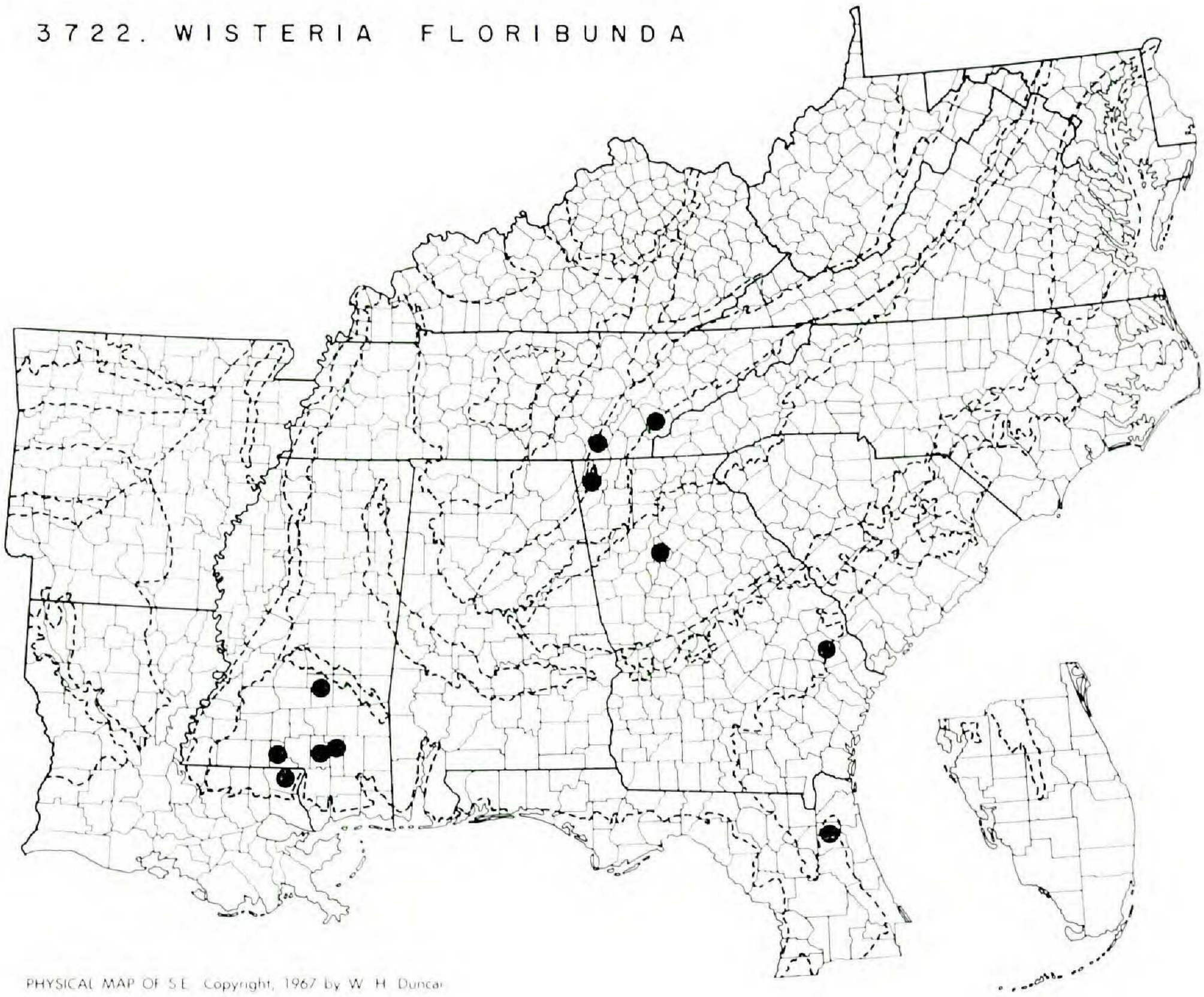
3722. WISTERIA FLORIBUNDA



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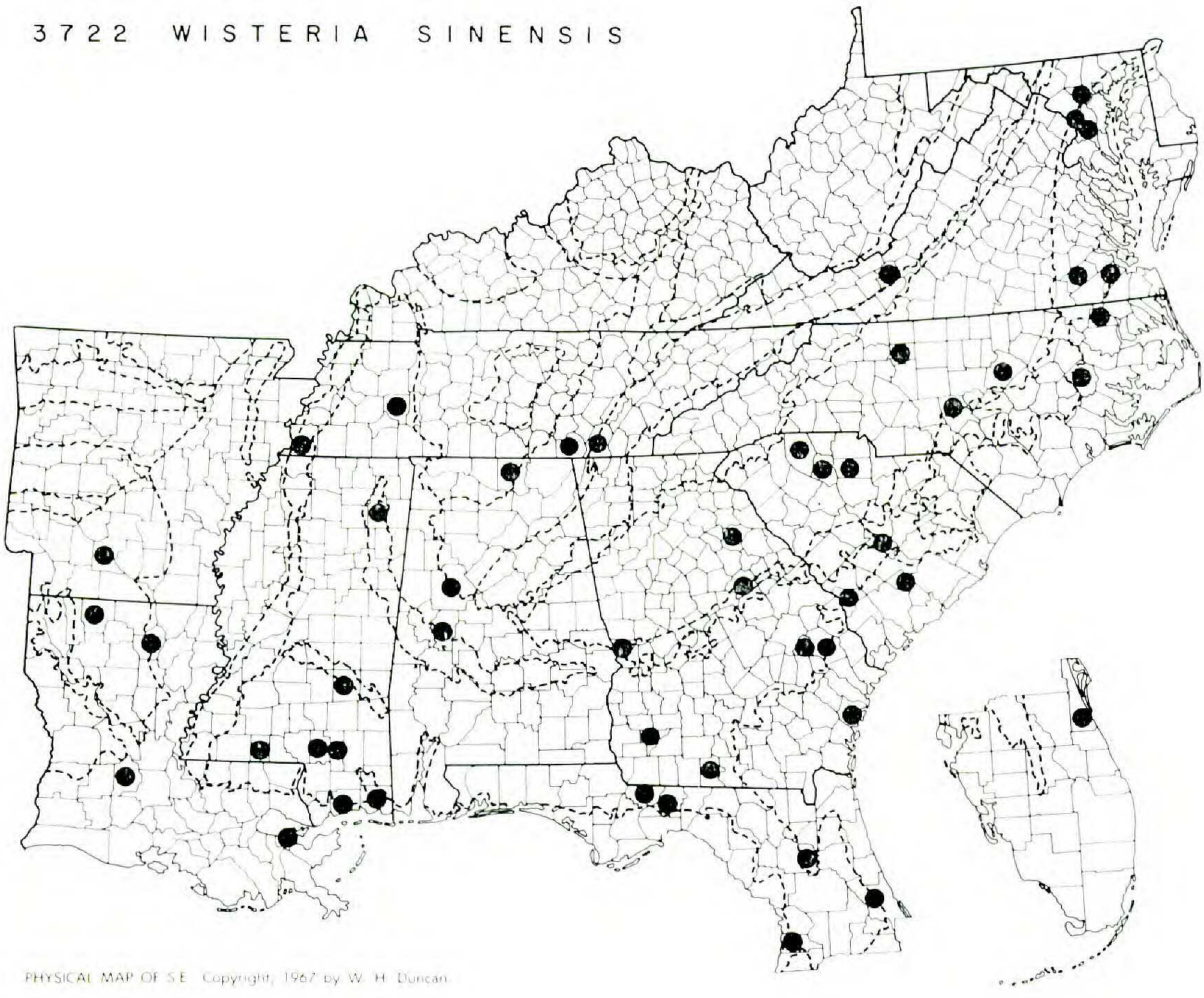

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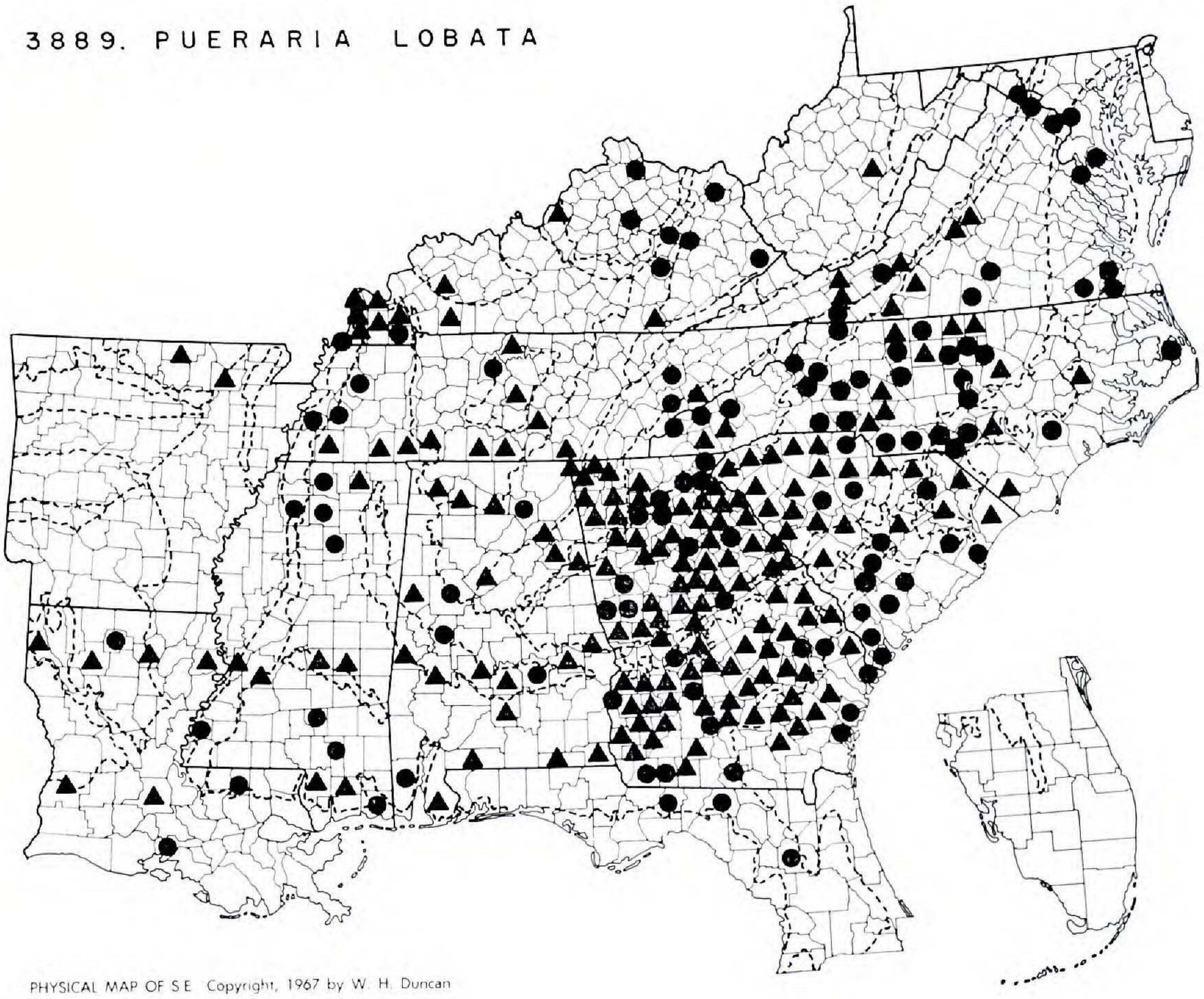
3889. PUERARIA LOBATA



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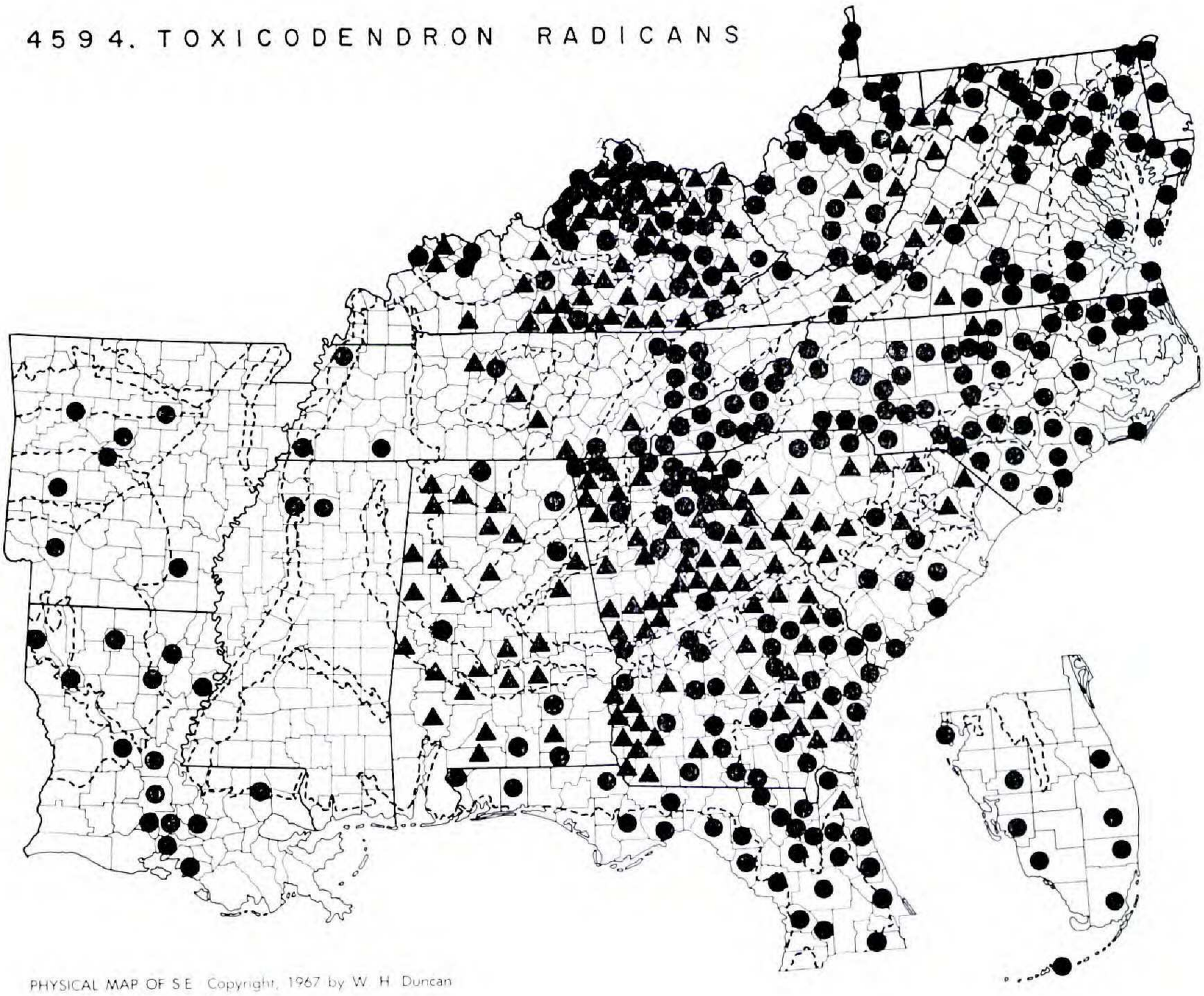
4594. TOXICODENDRON RADICANS



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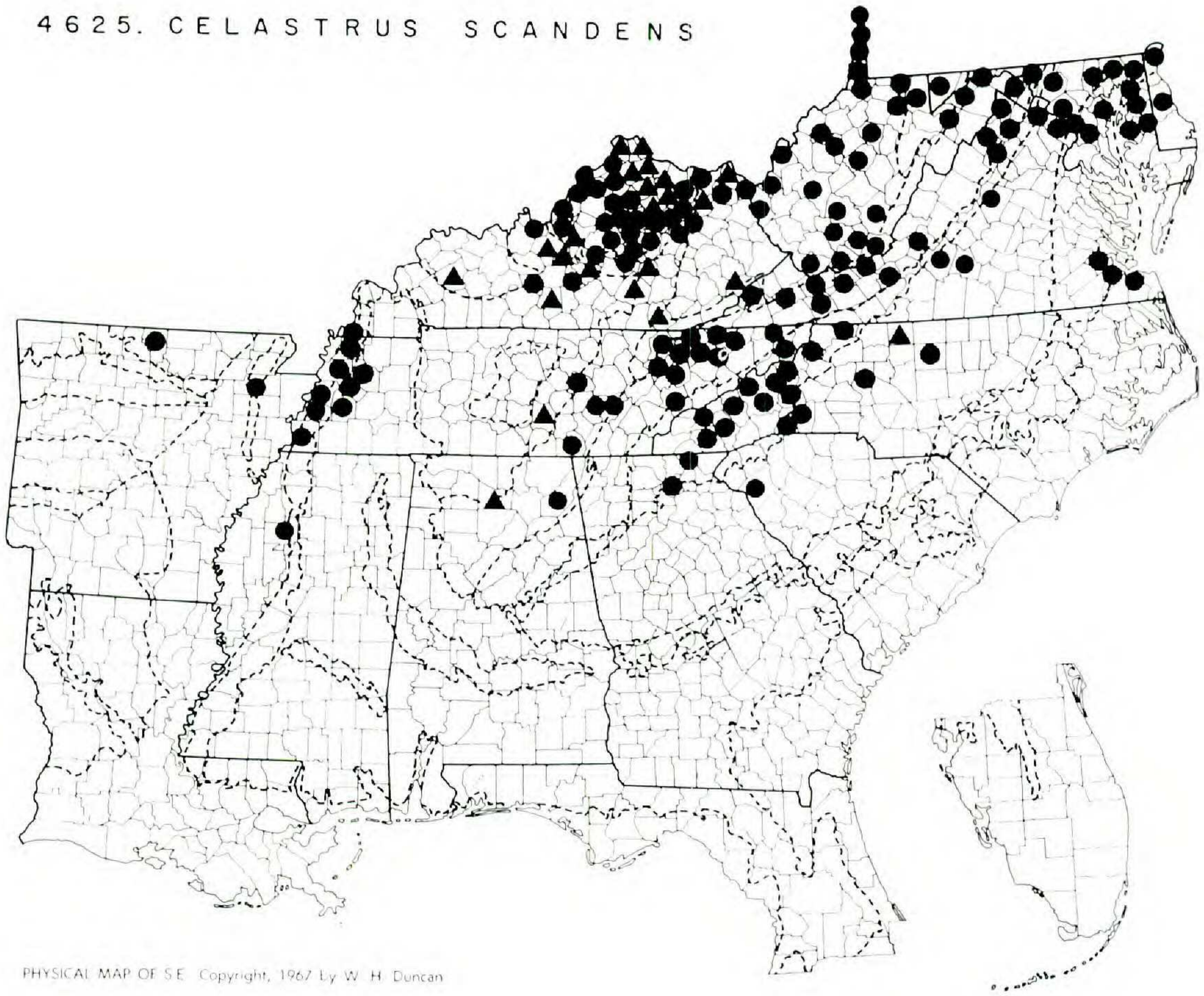
4625. CELASTRUS SCANDENS



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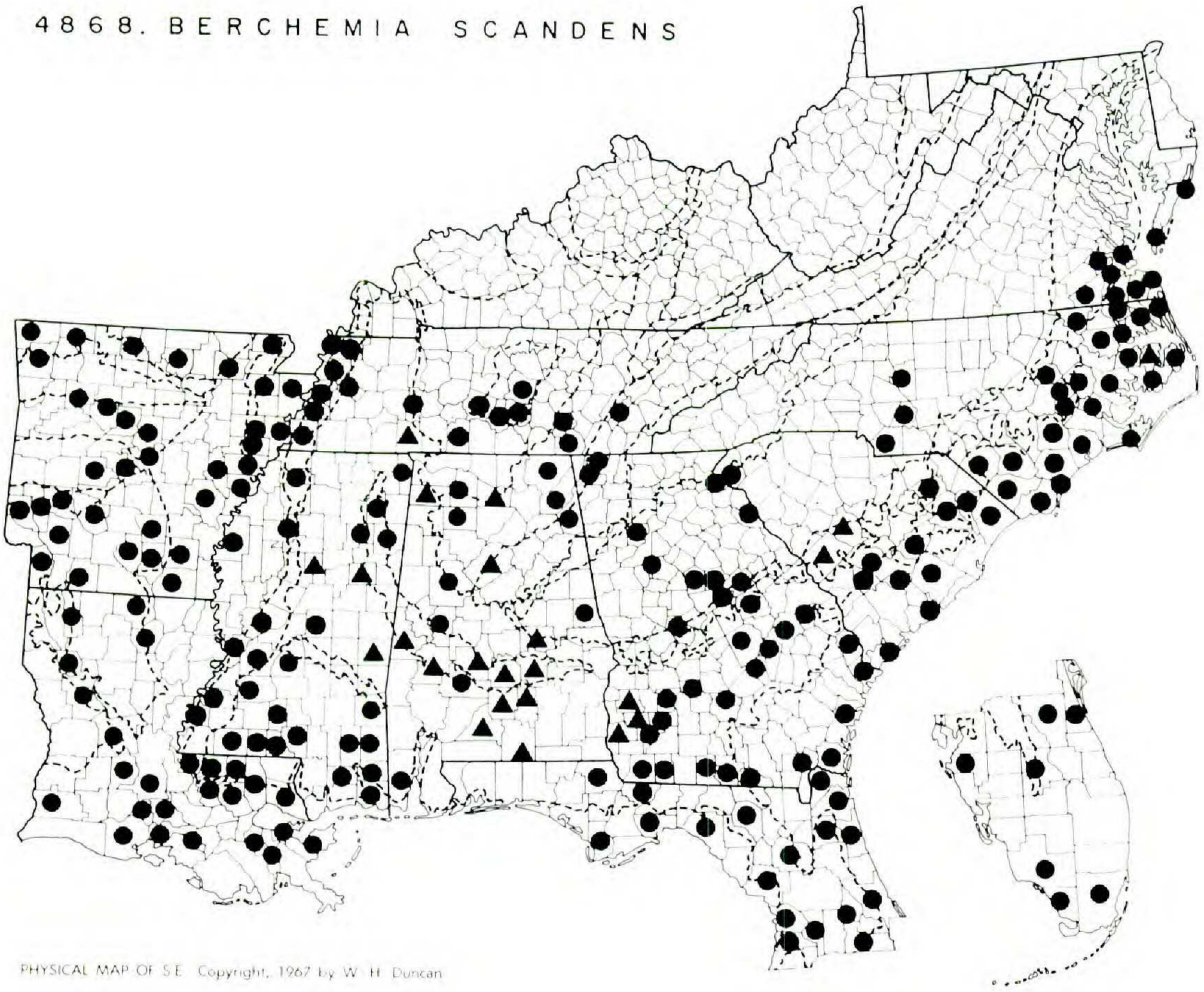

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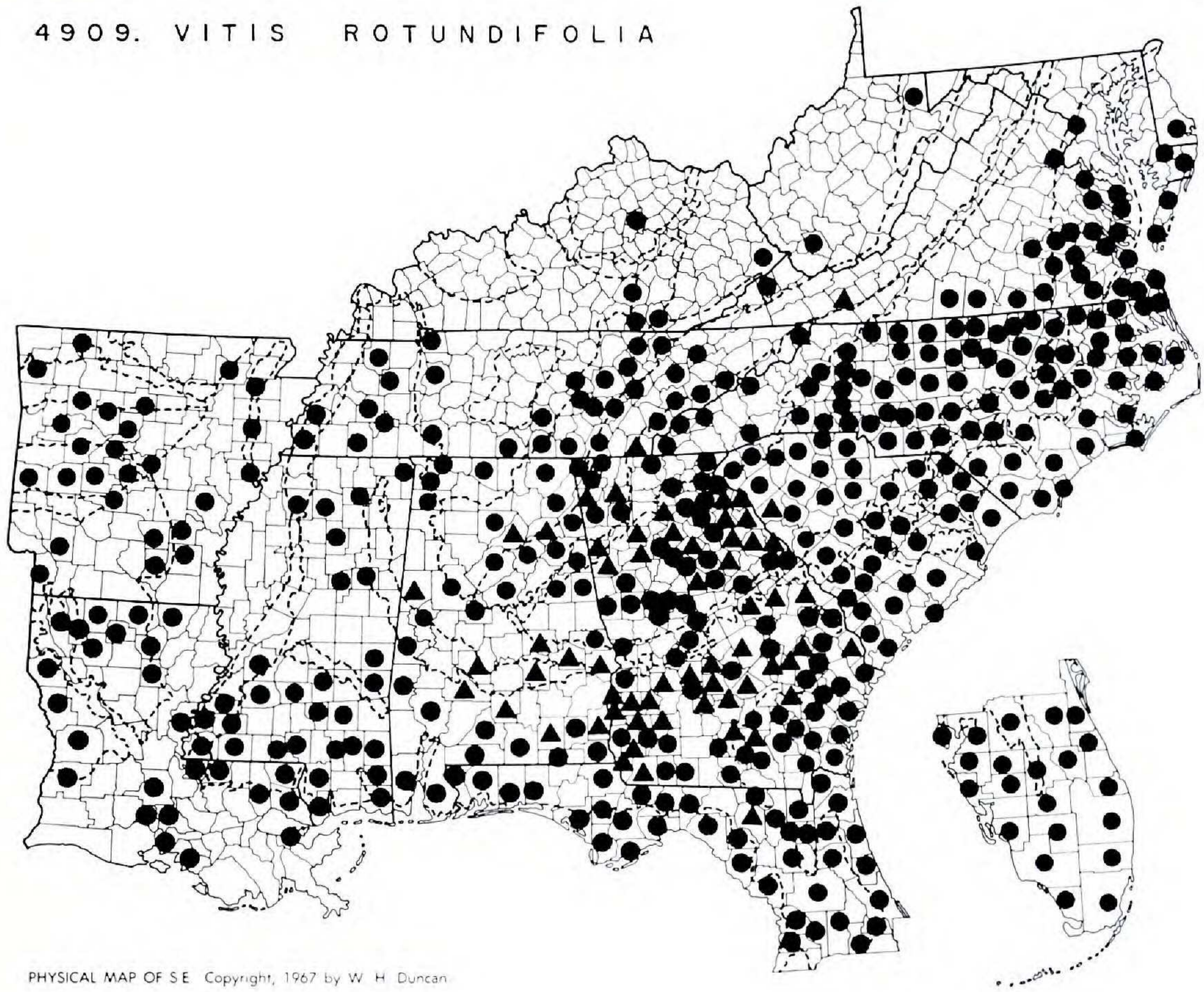

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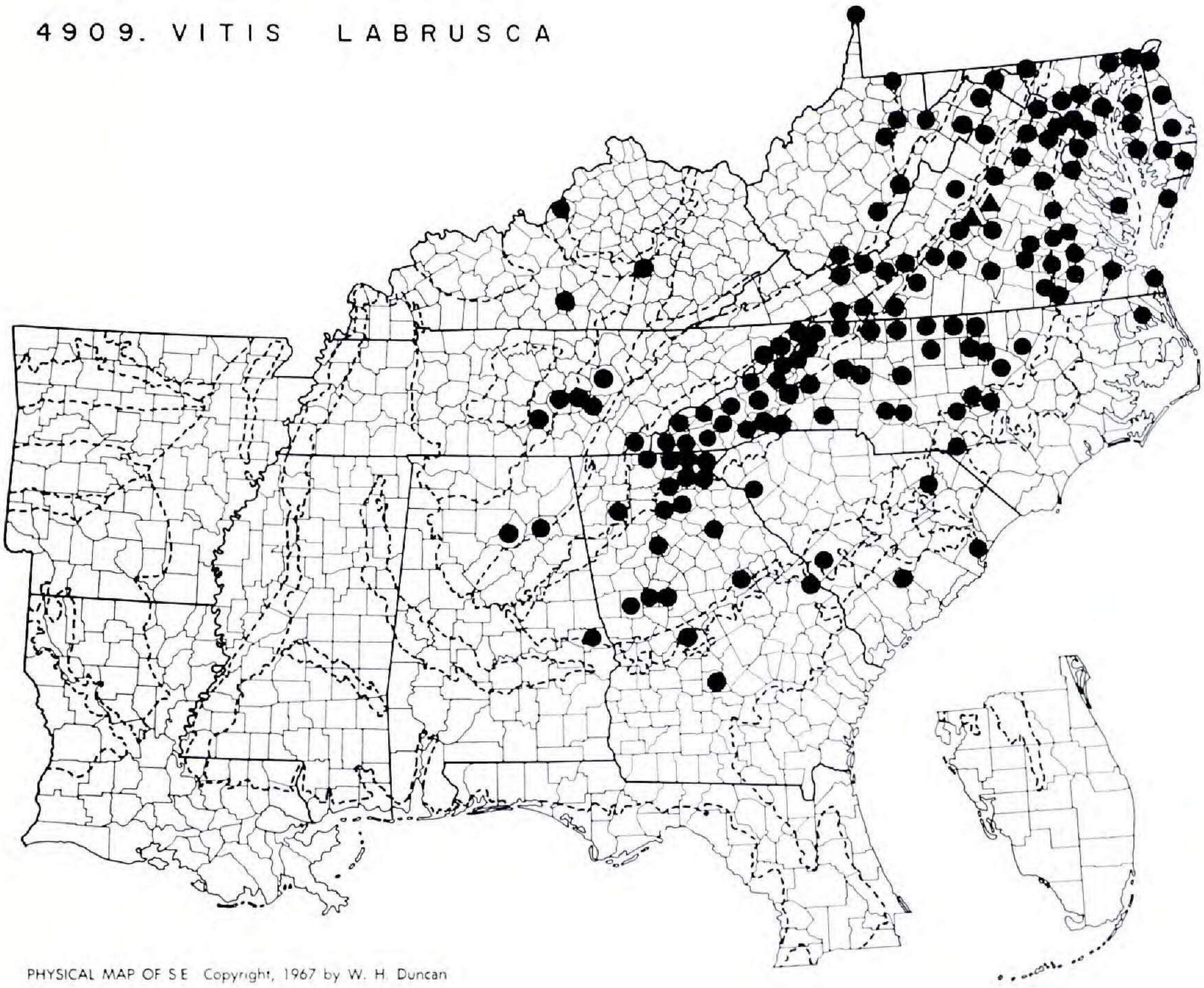

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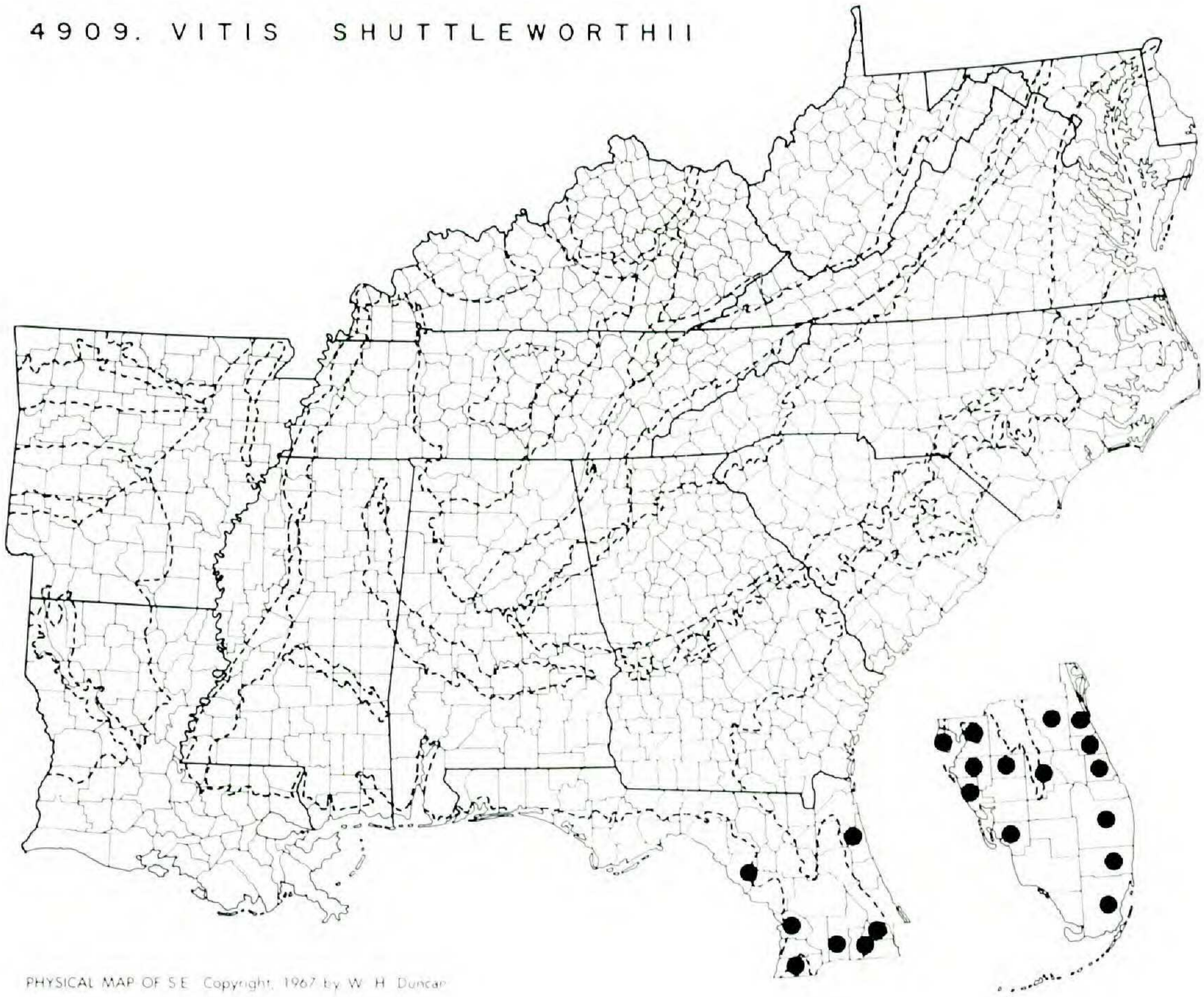

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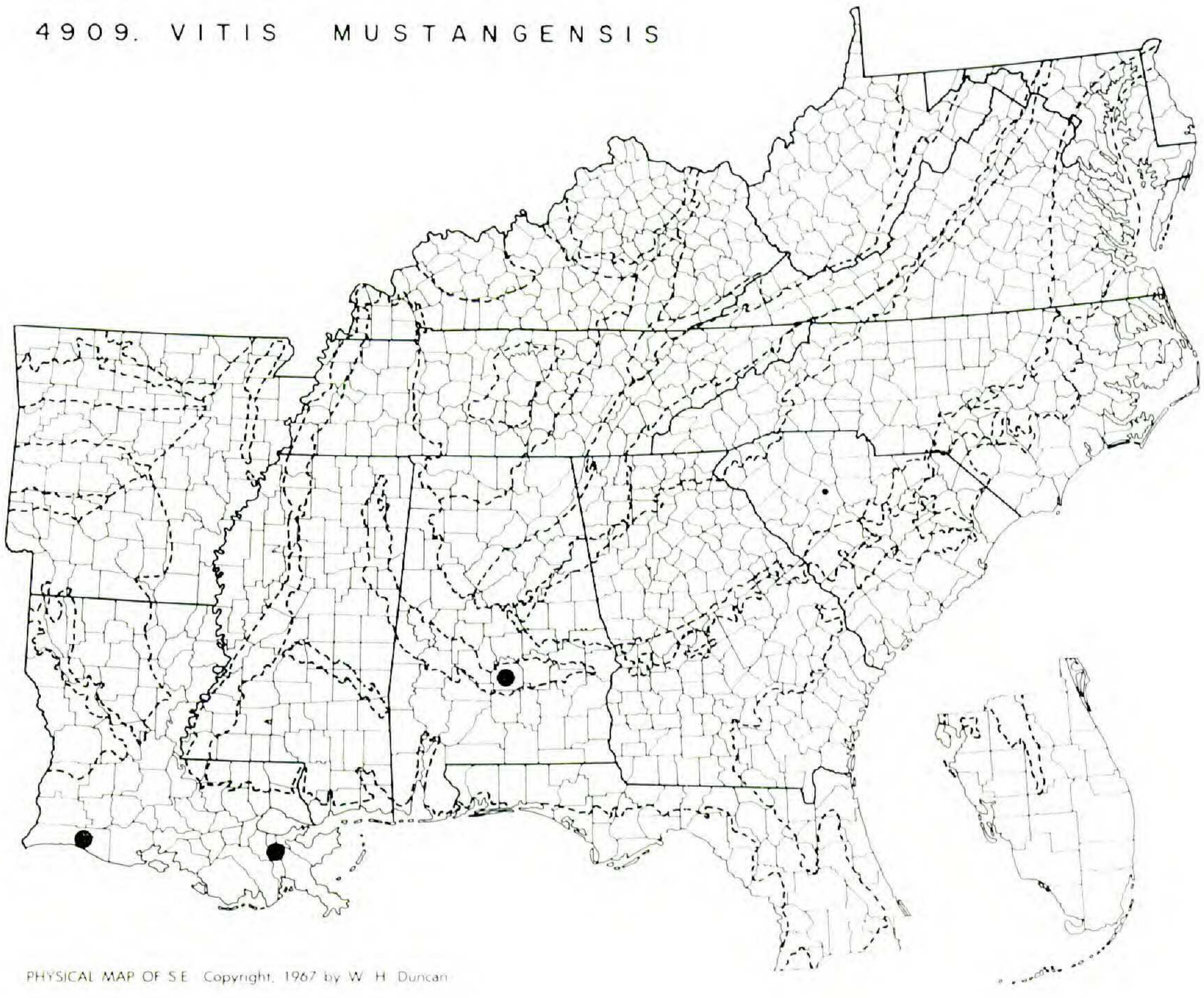

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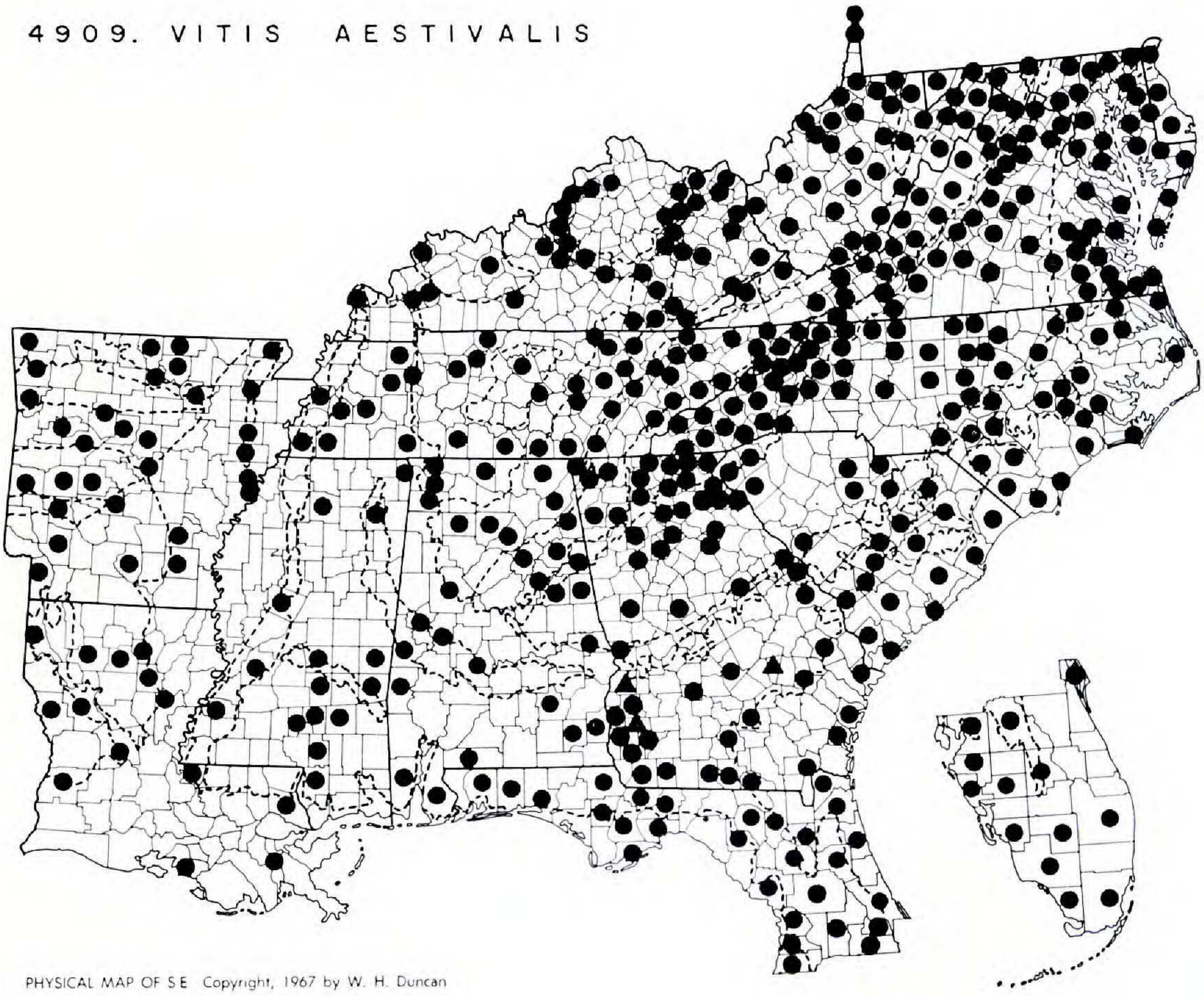

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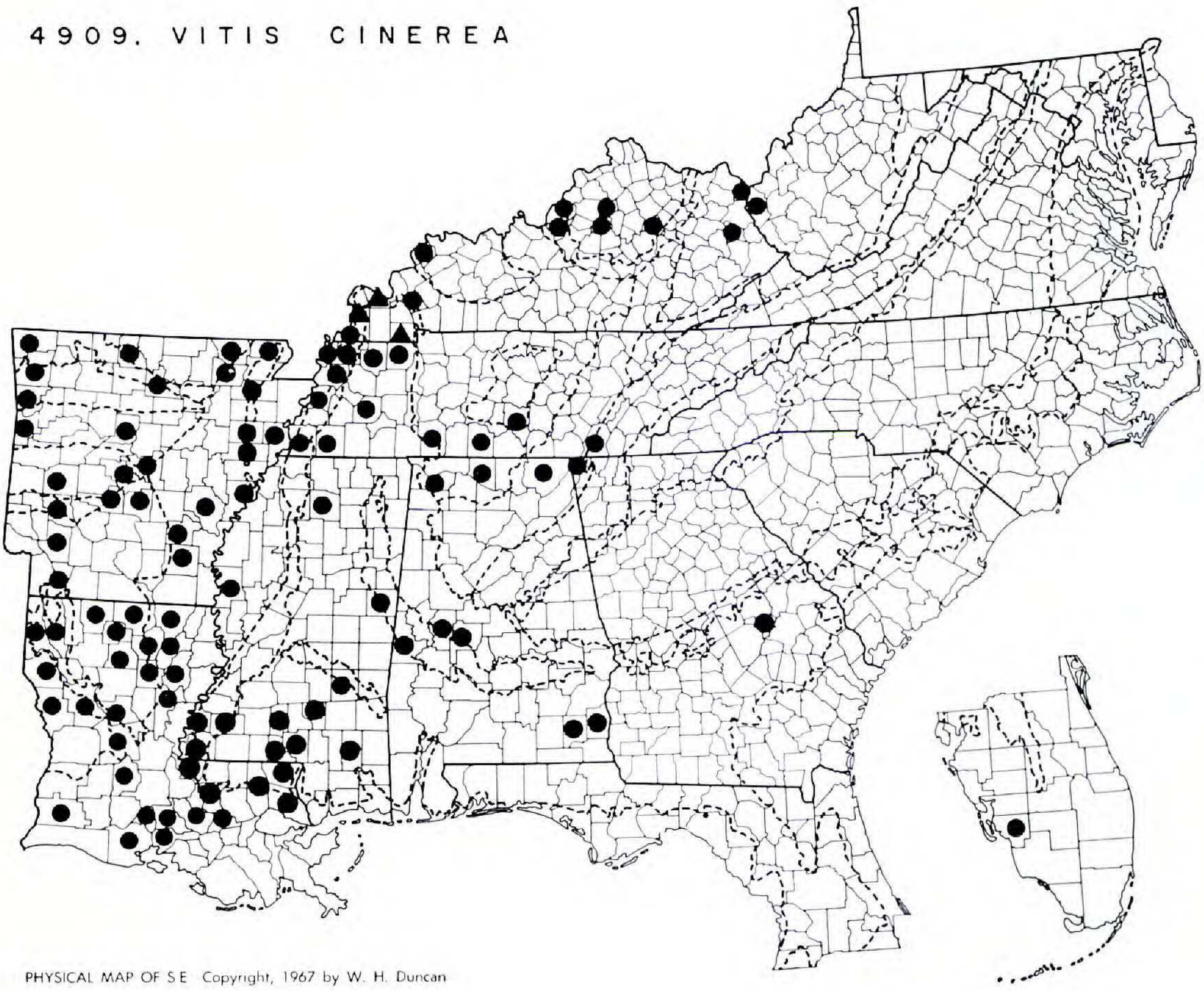

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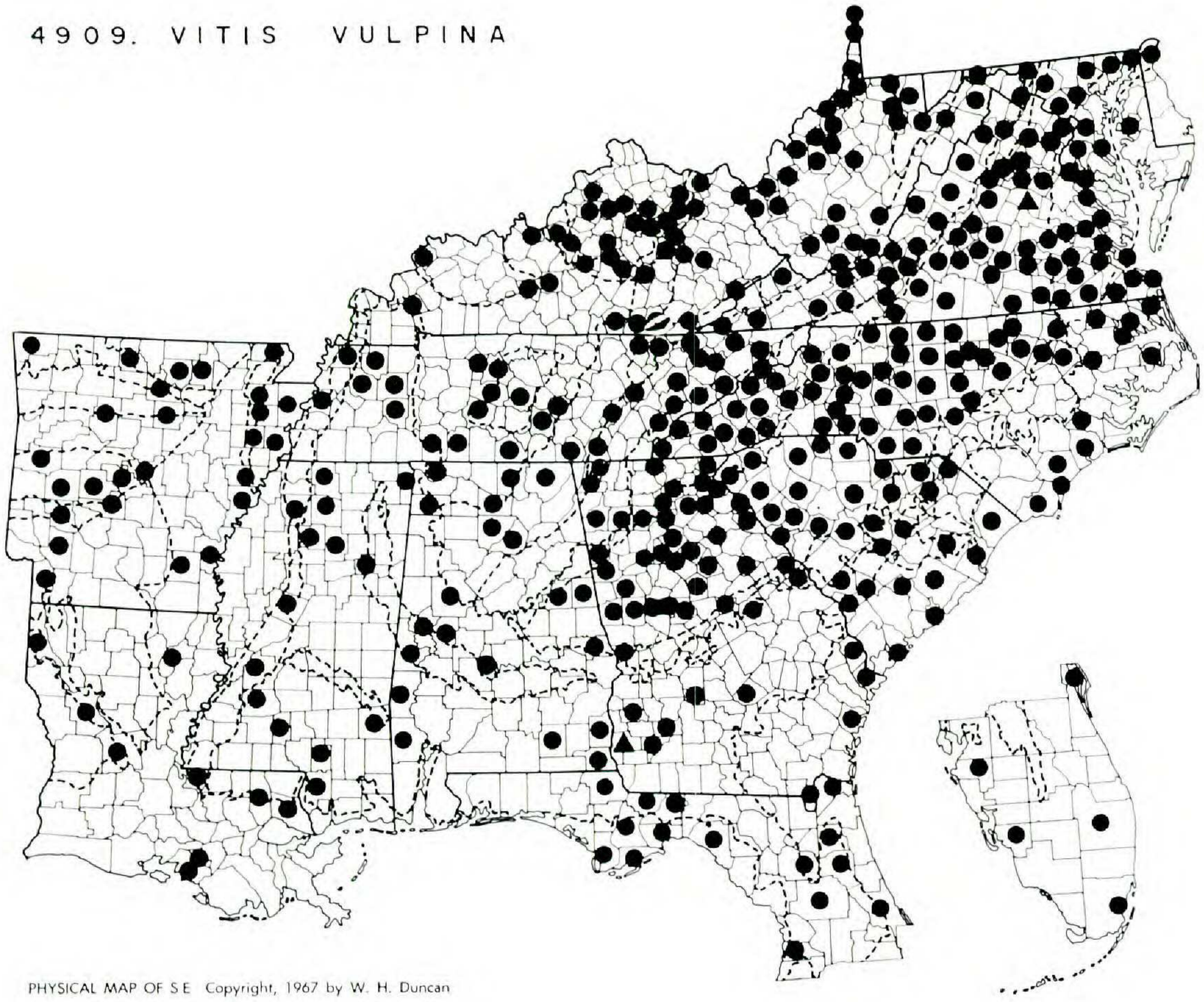

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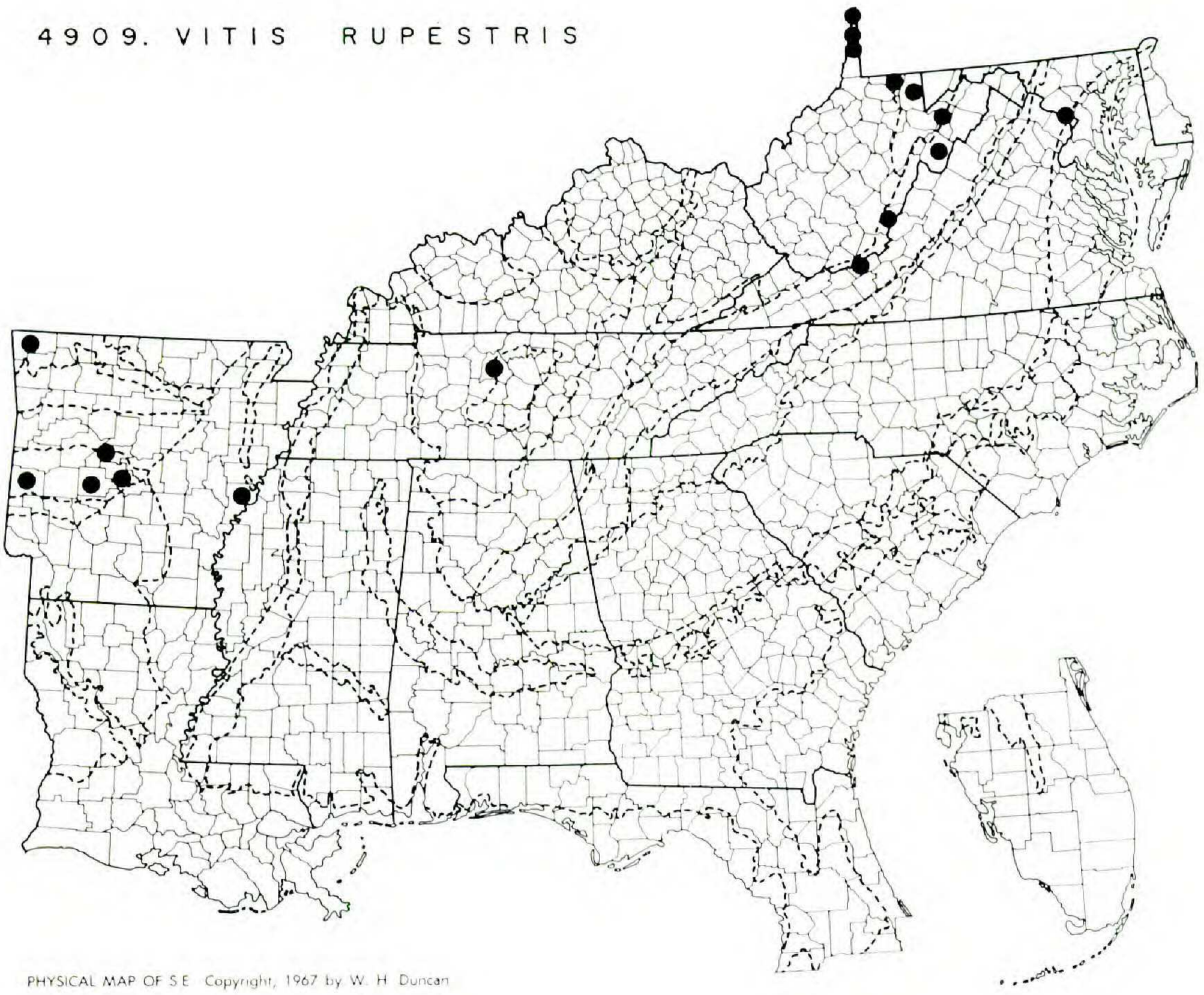

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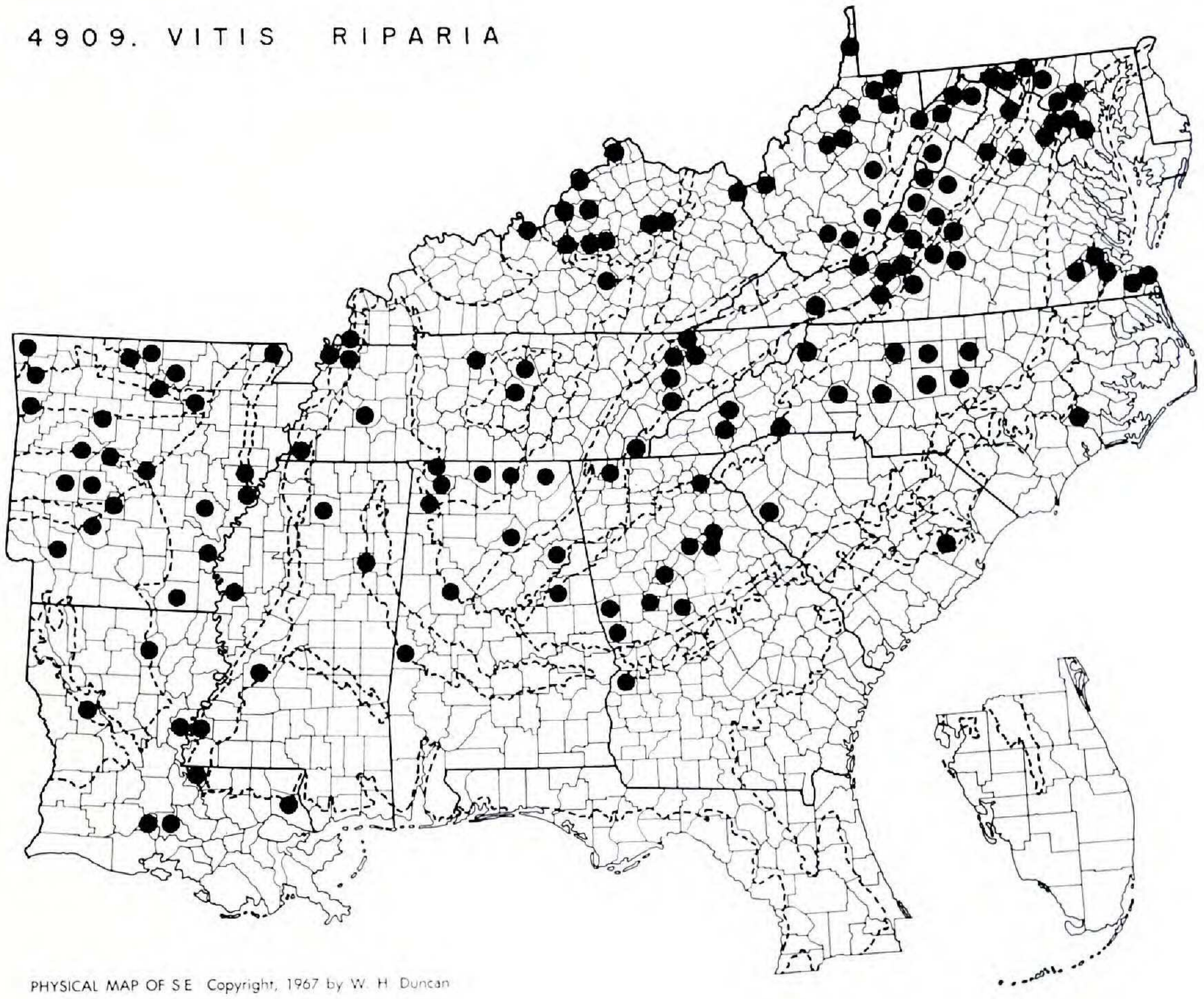

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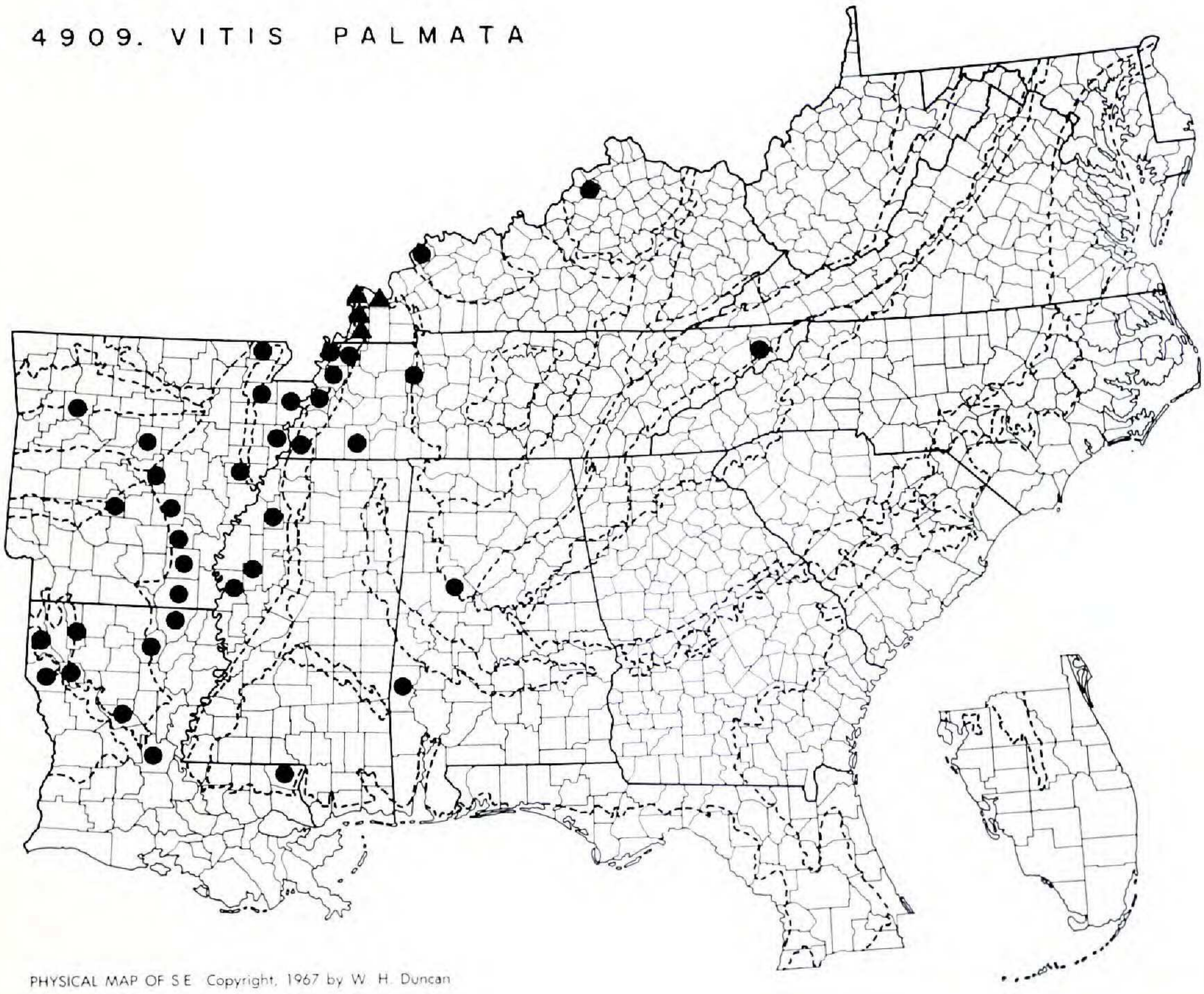

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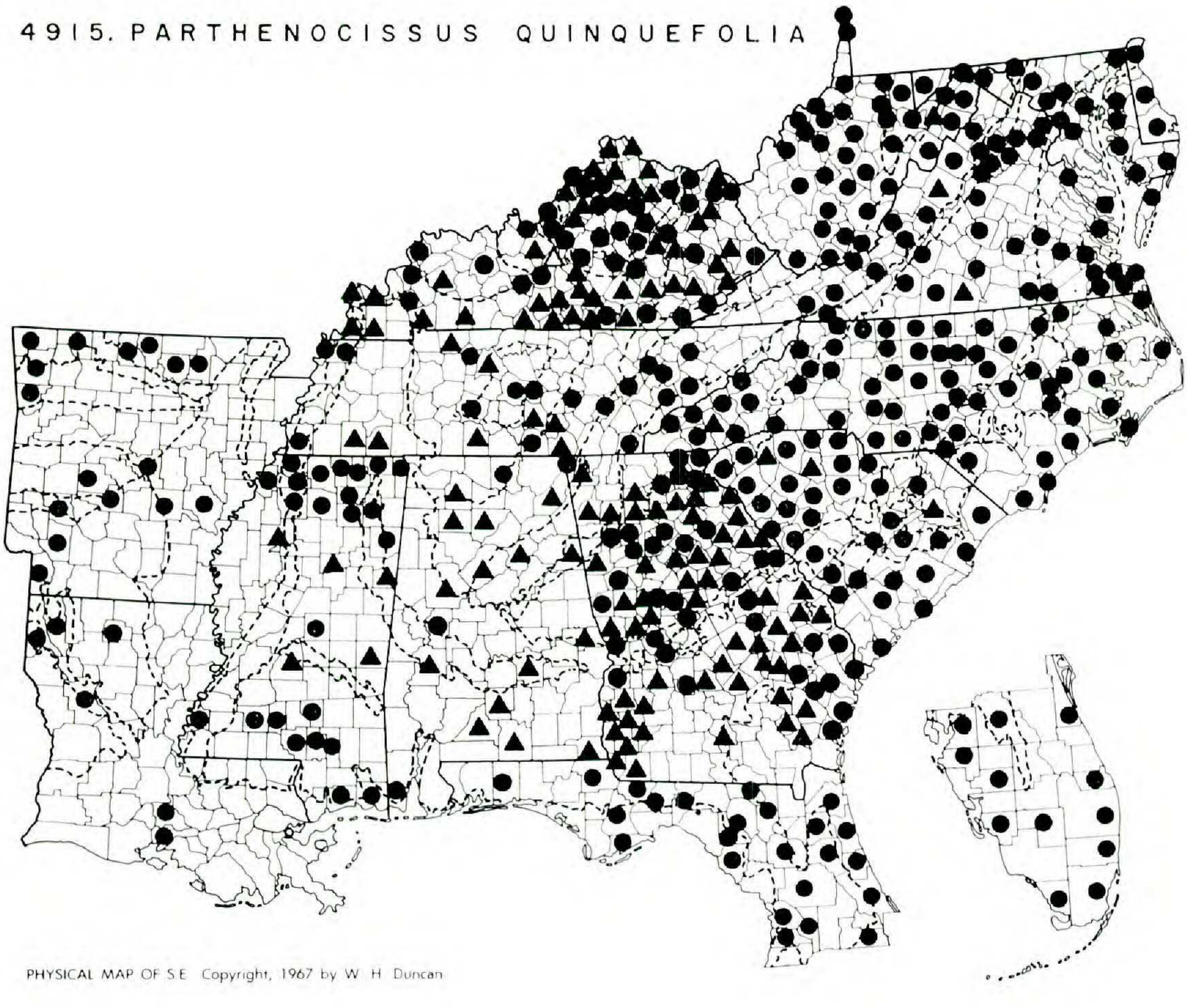

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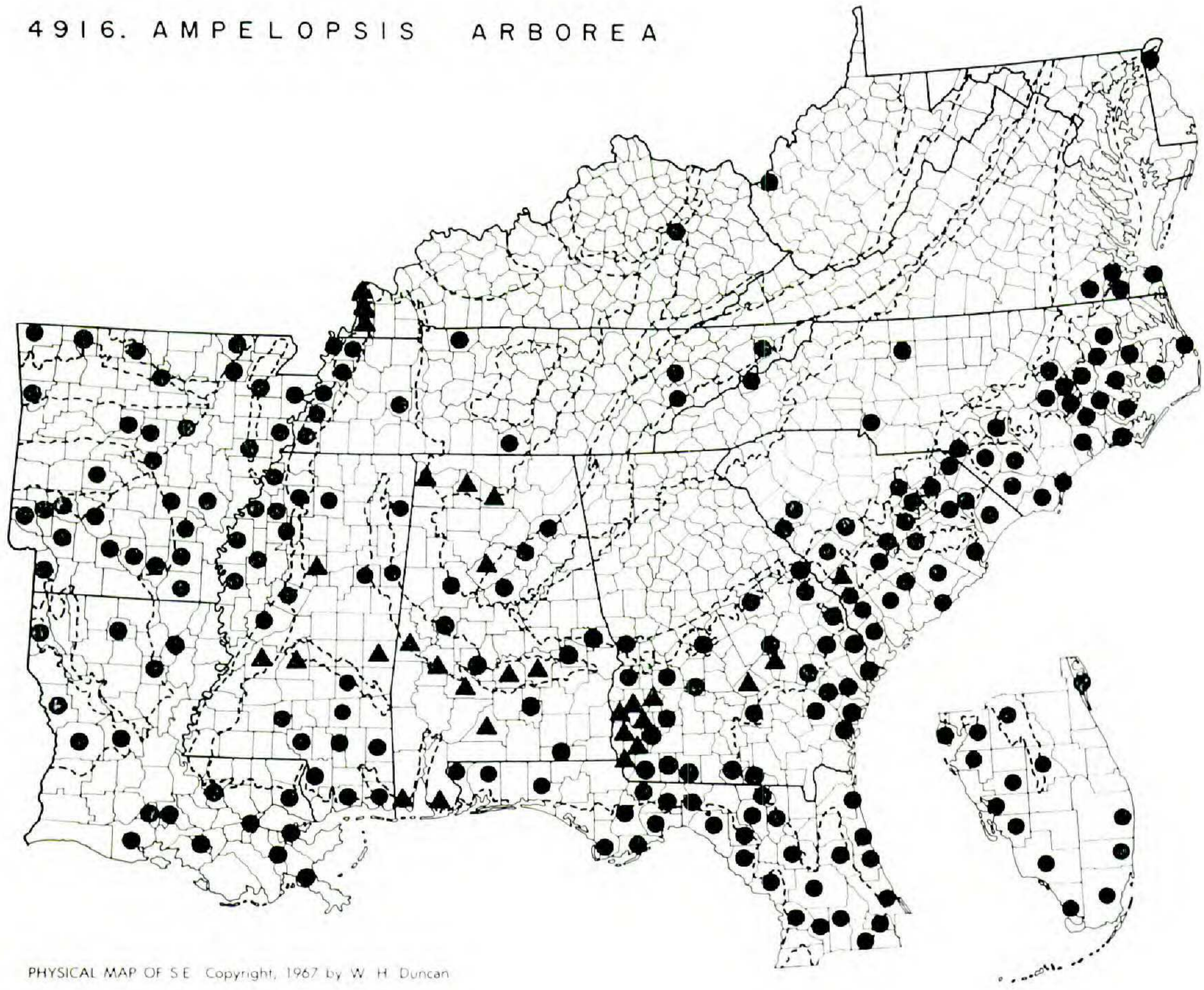

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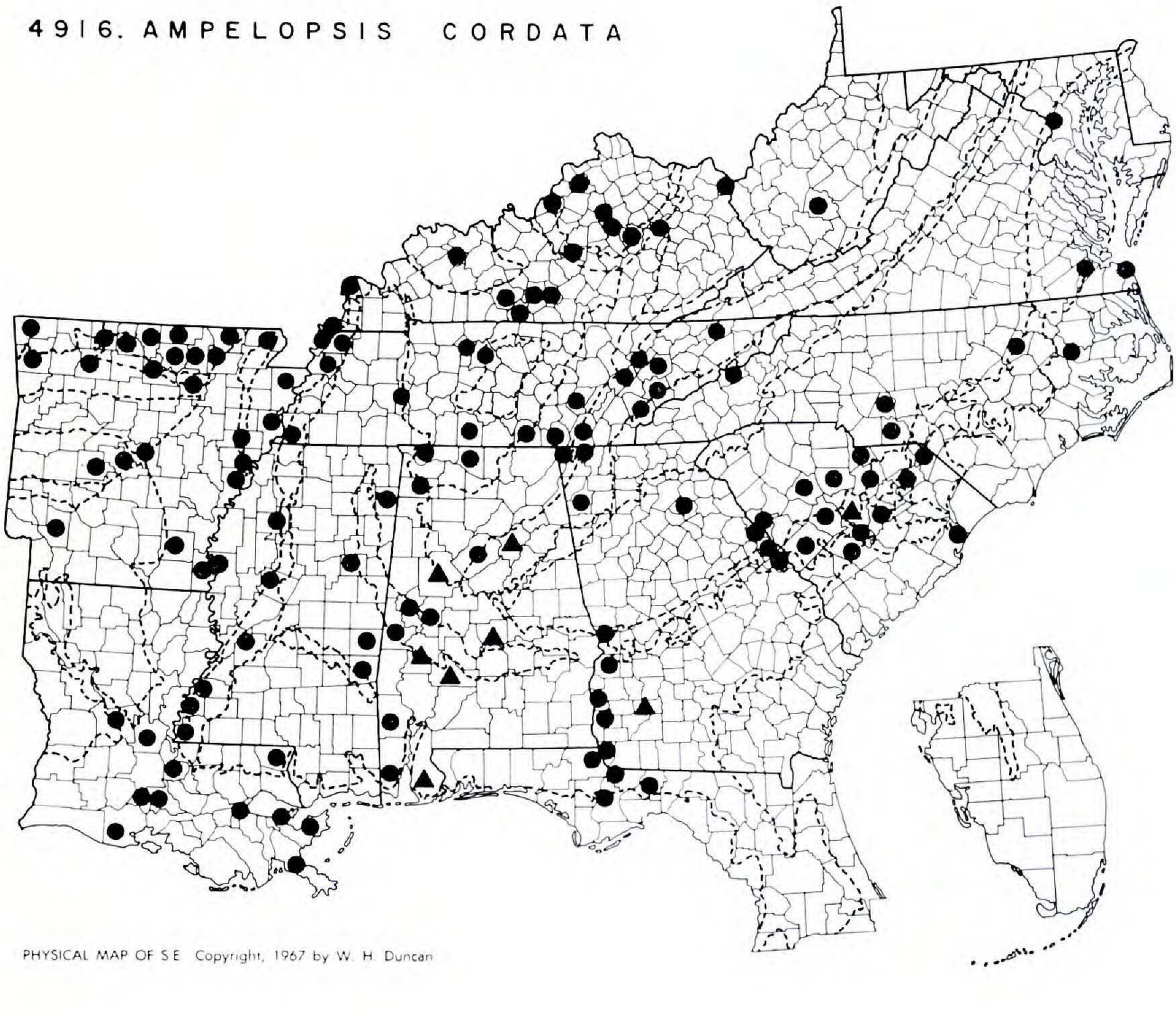

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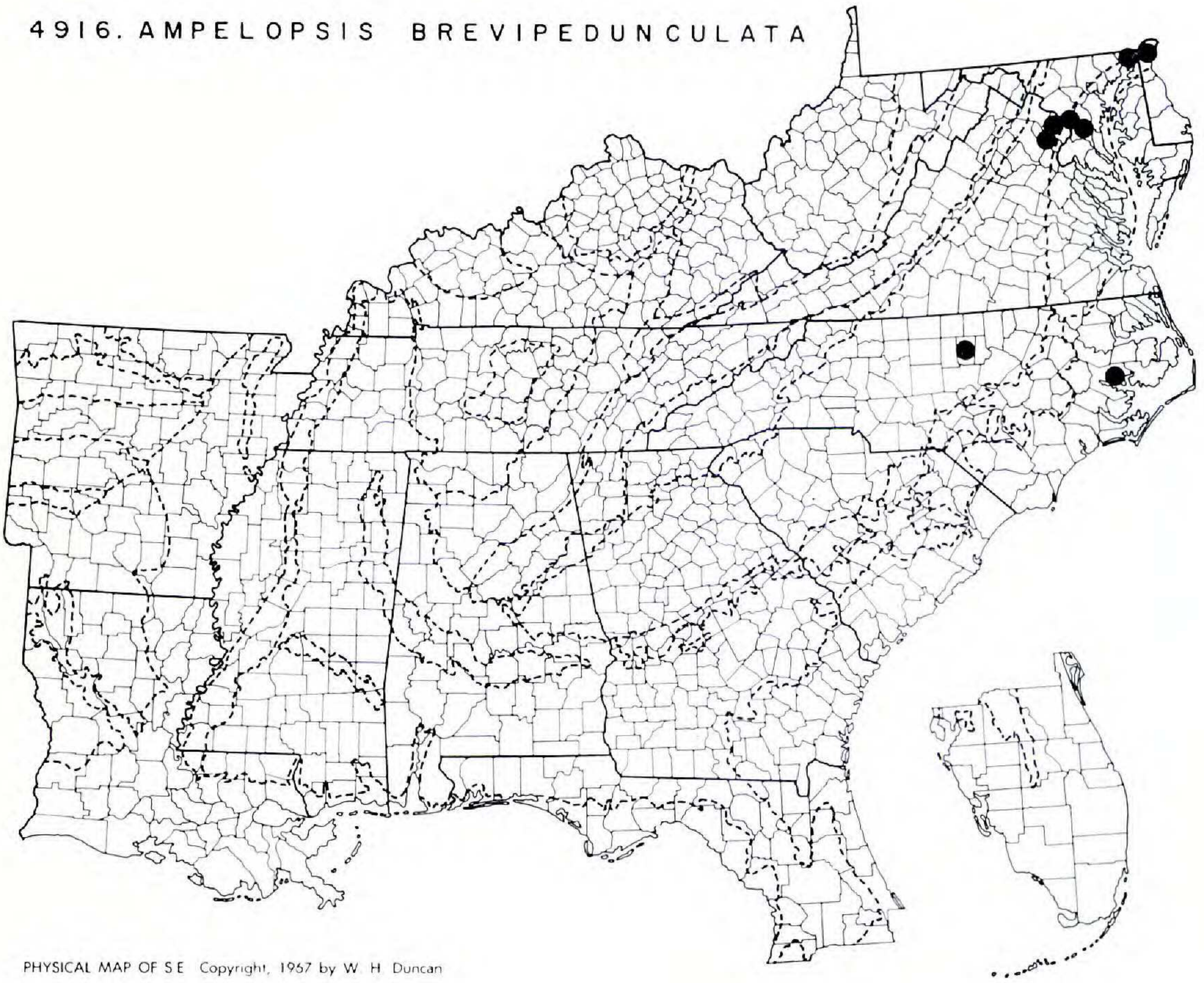

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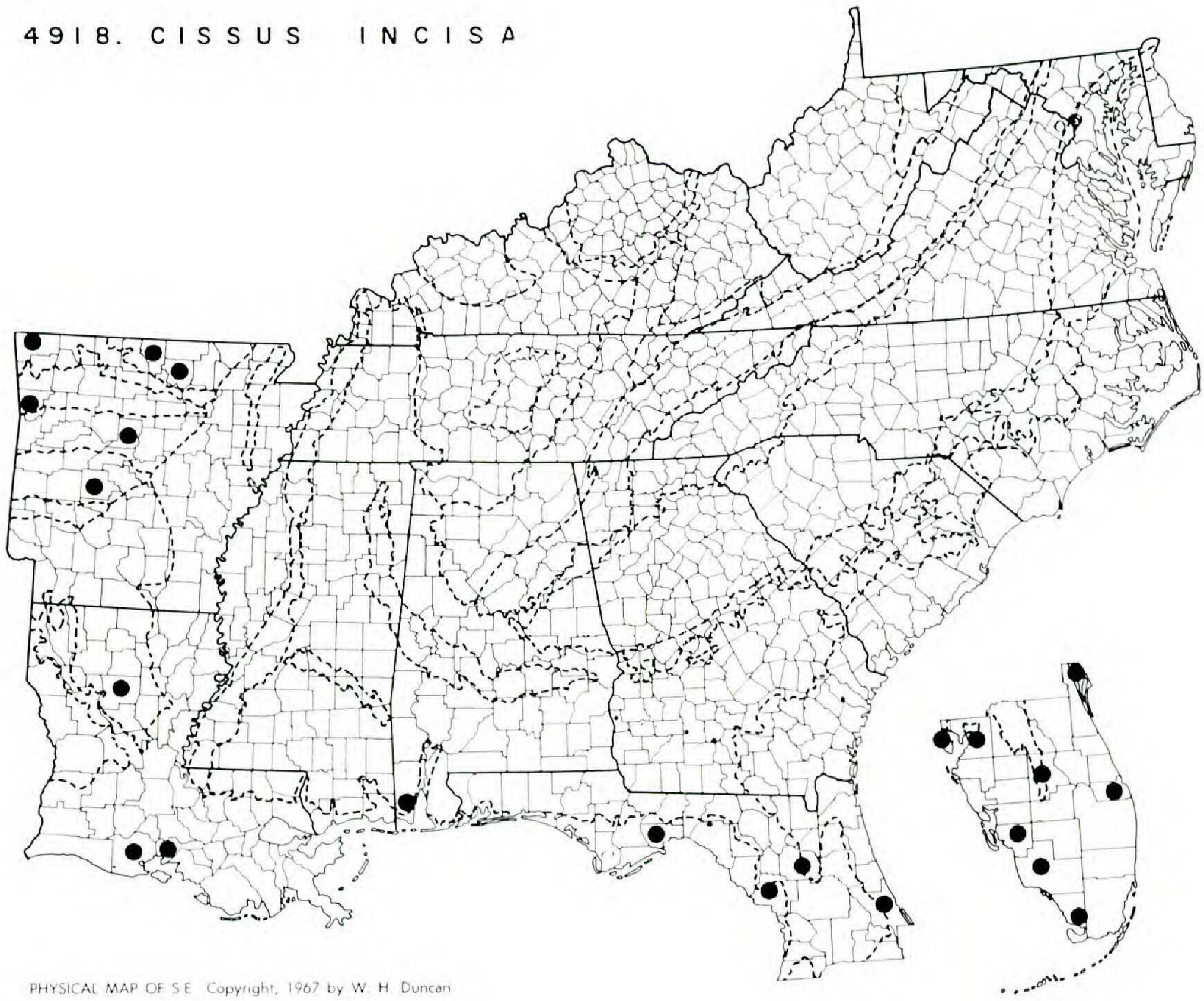
4918. CISSUS INCISA



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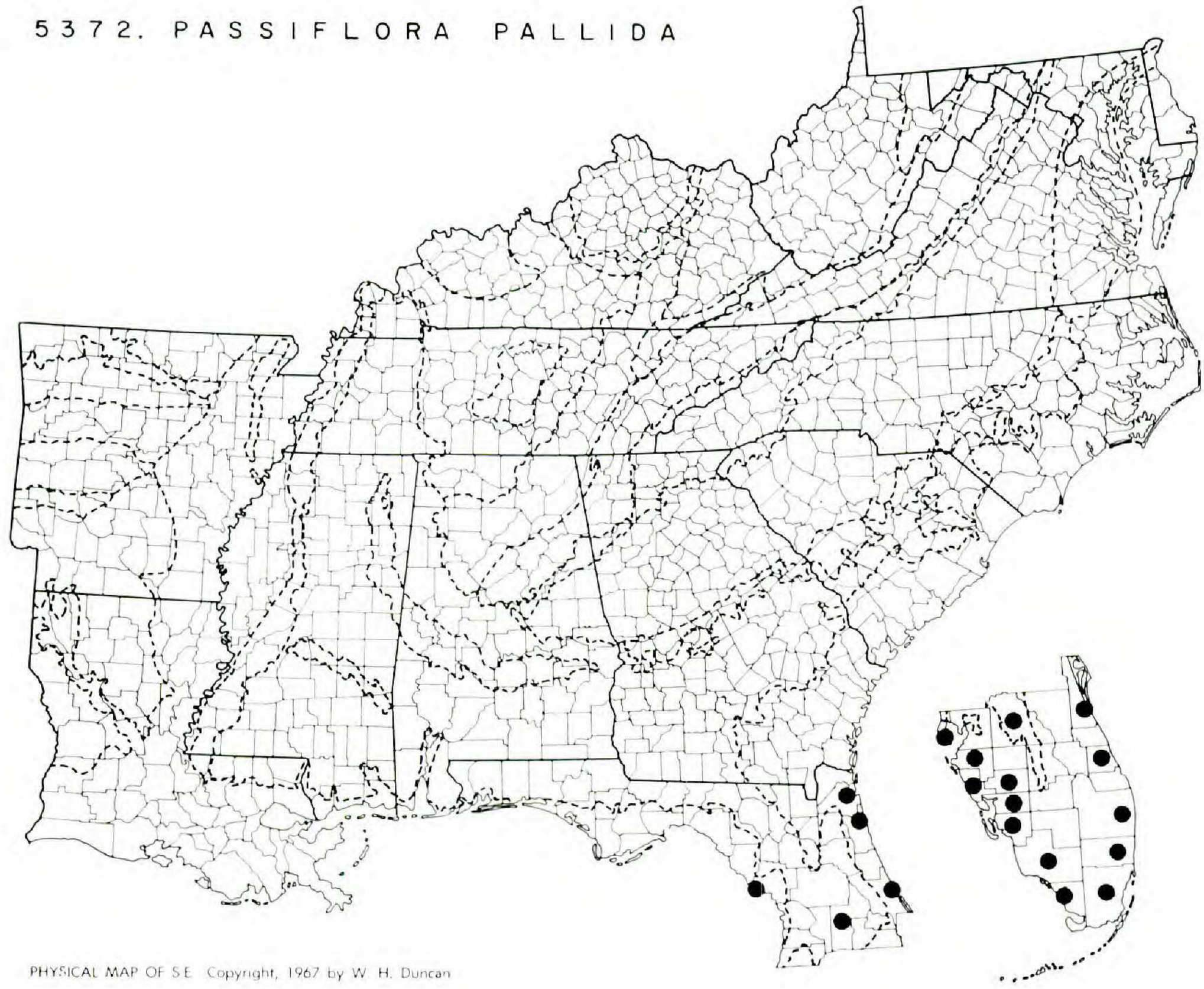
5372. PASSIFLORA PALLIDA



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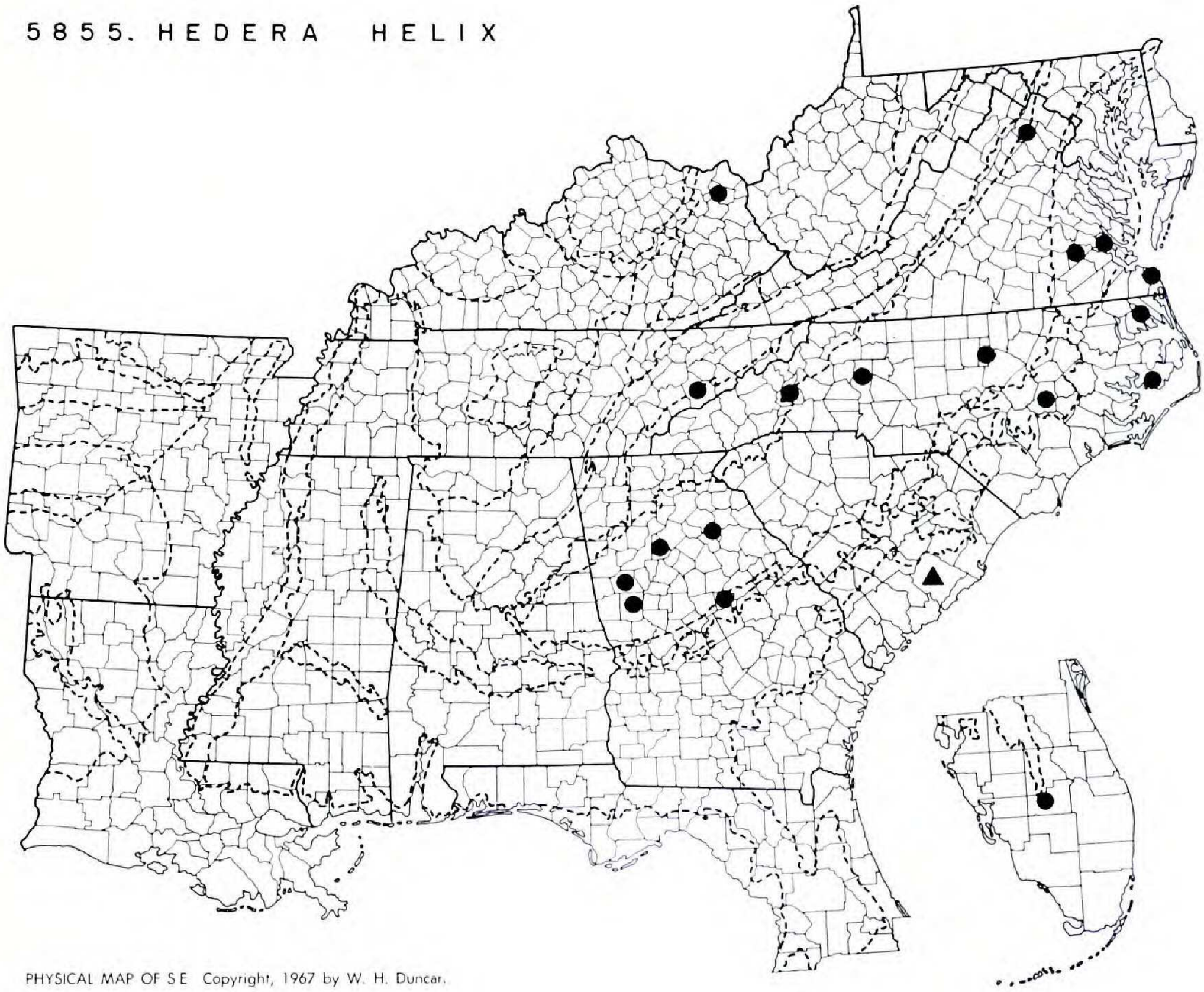
5855. HEDERA HELIX



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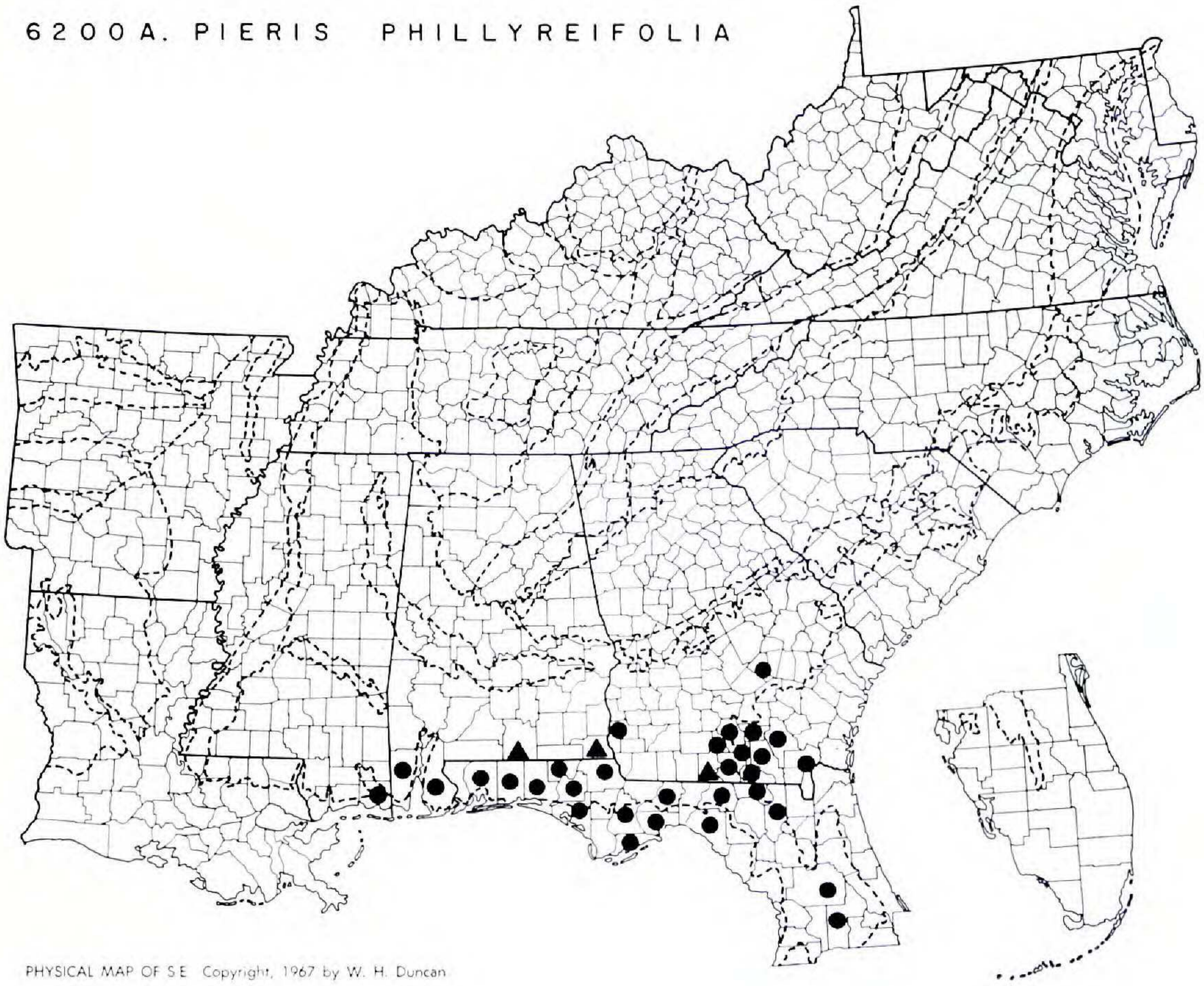
6200A. PIERIS PHILLYREIFOLIA



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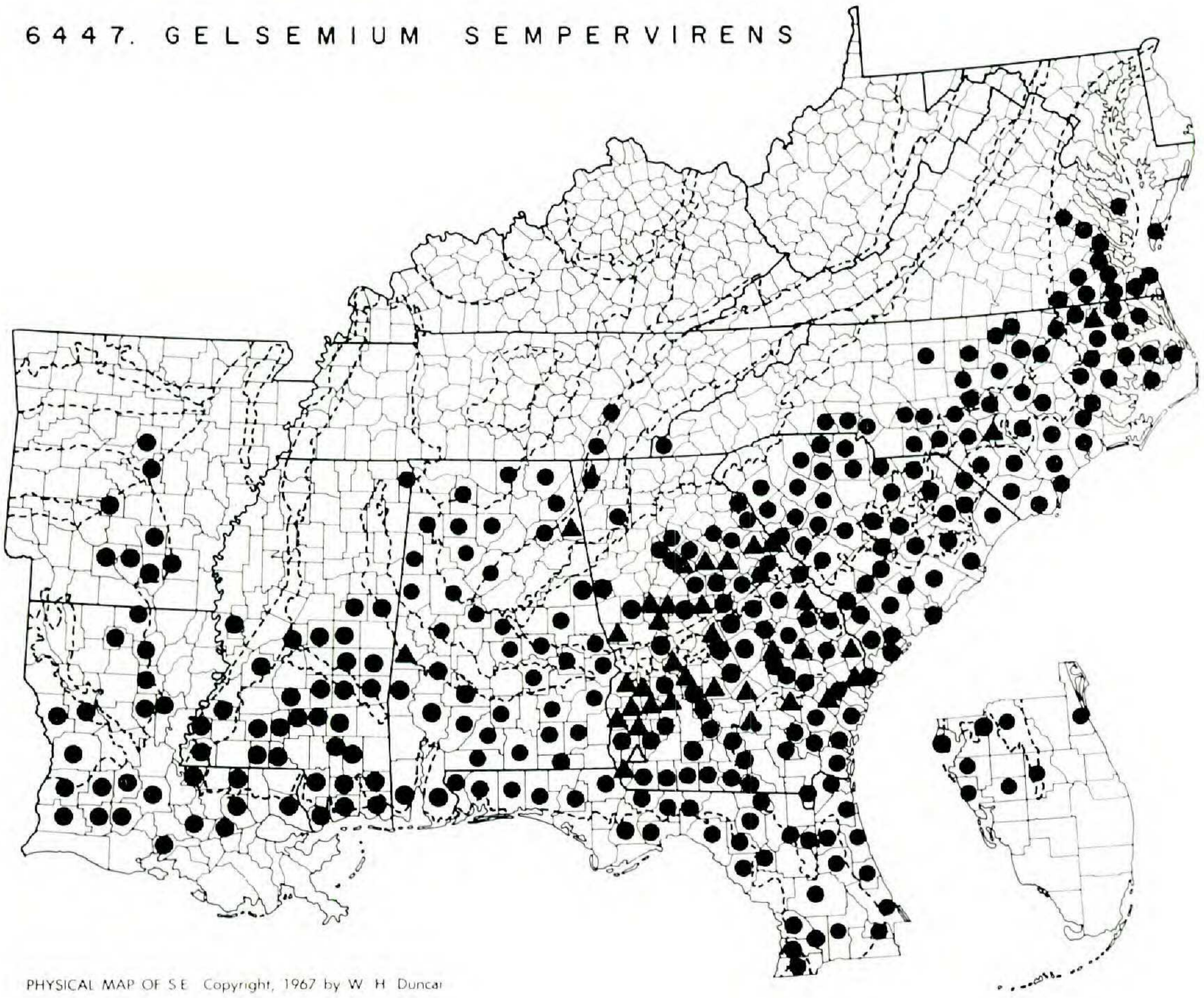
6447. GELSEMIUM SEMPERVIRENS



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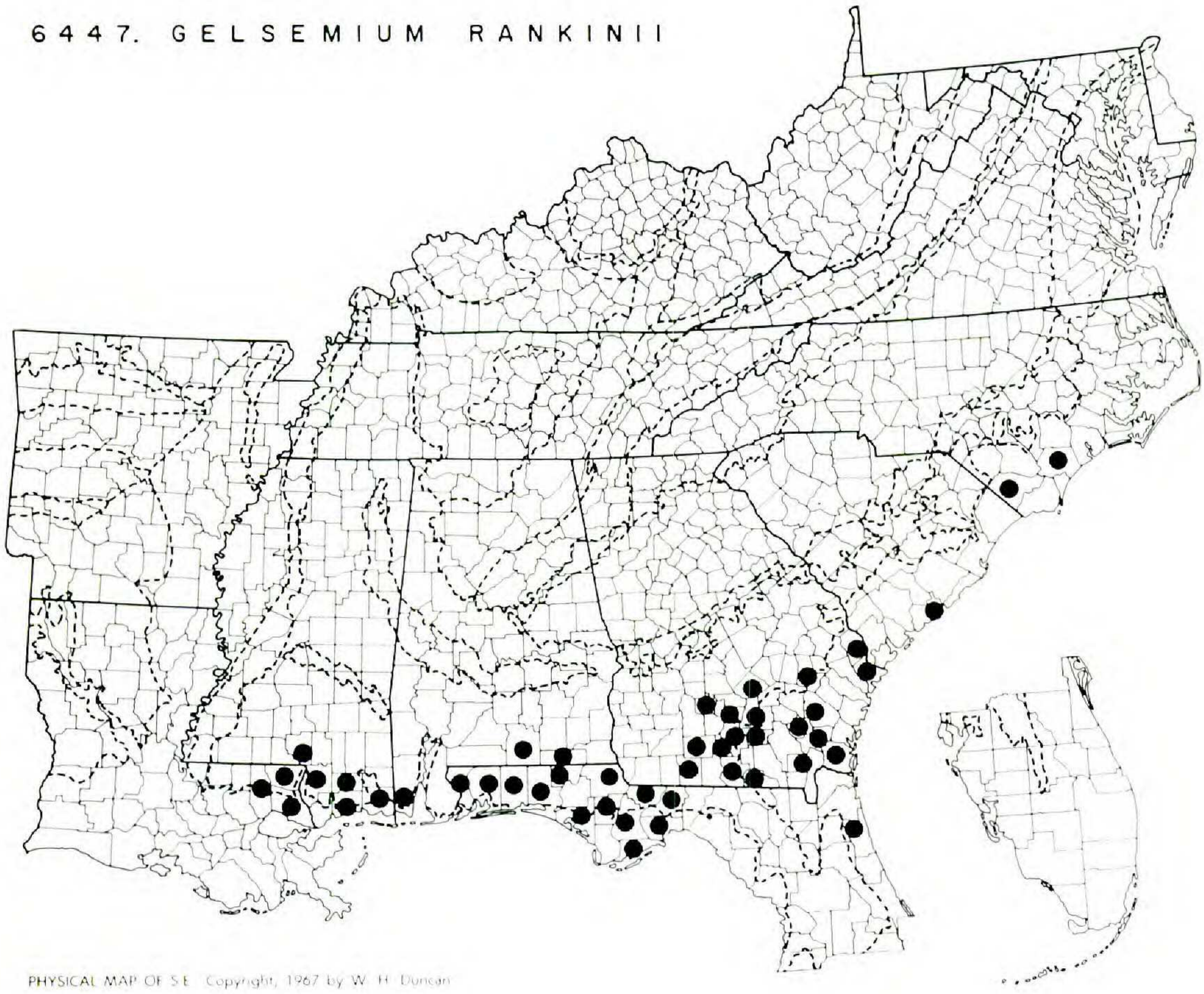
6447. GELSEMIUM RANKINII



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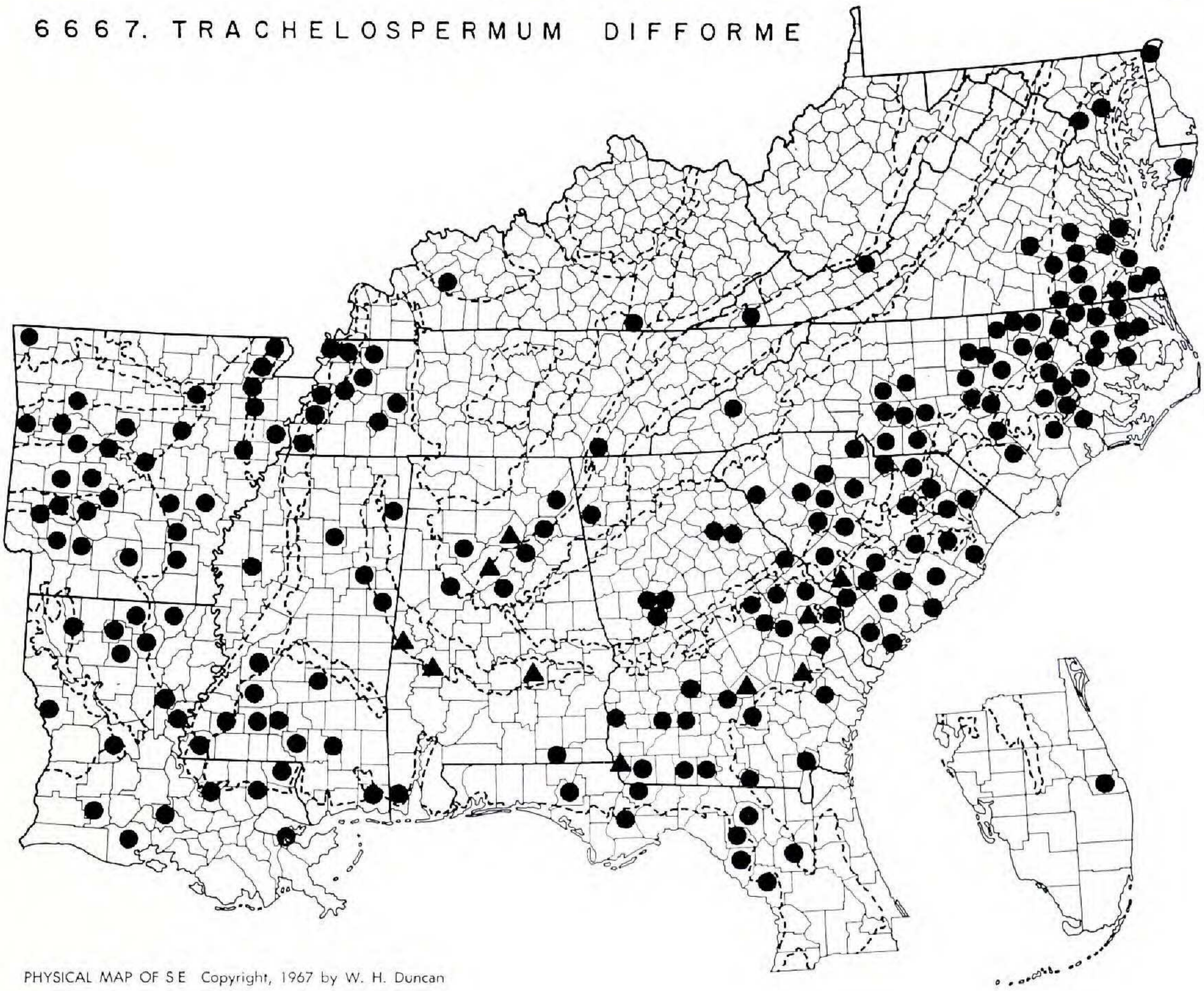
6667. TRACHELOSPERMUM DIFFORME



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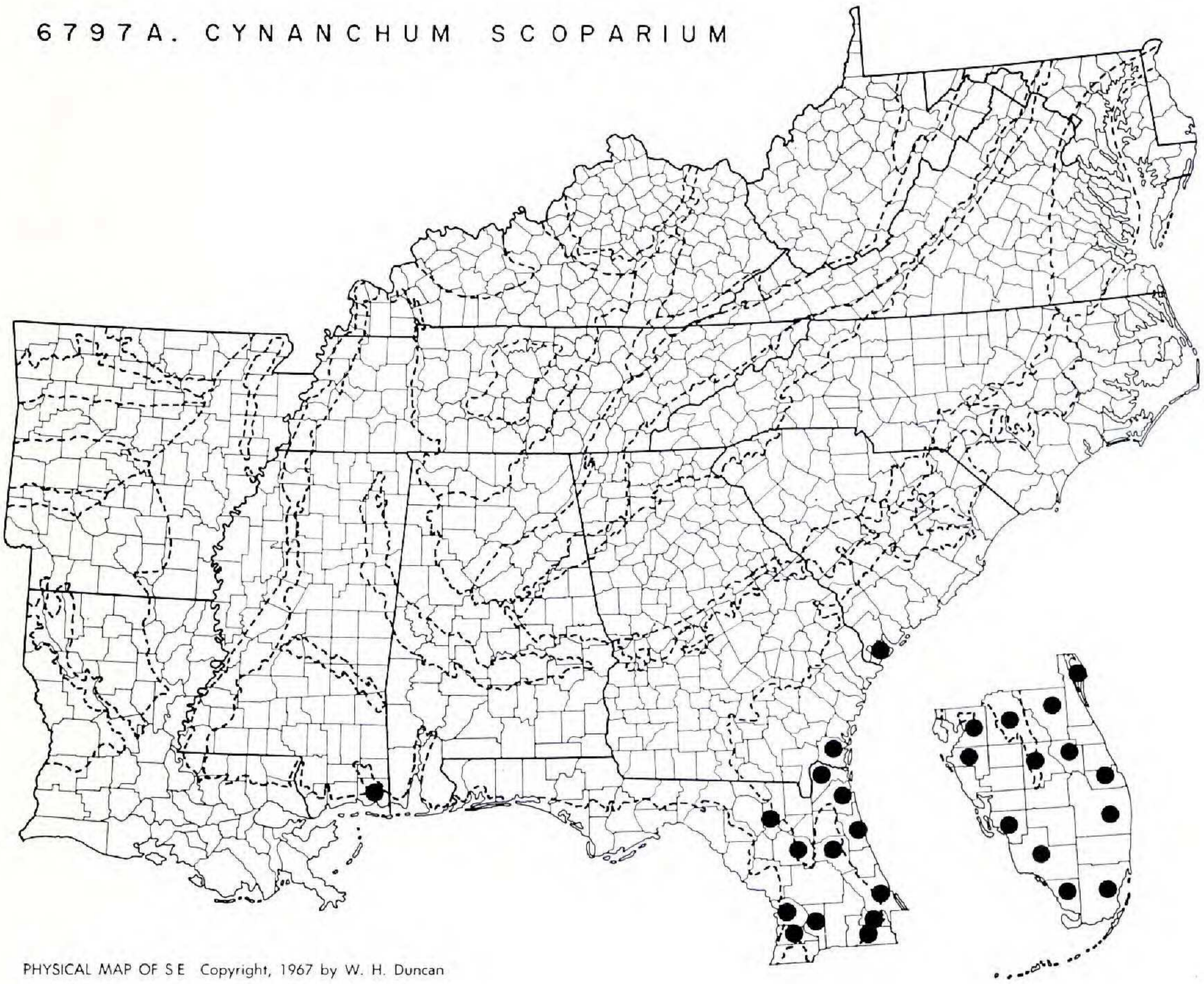
6797A. CYNANCHUM SCOPARIUM



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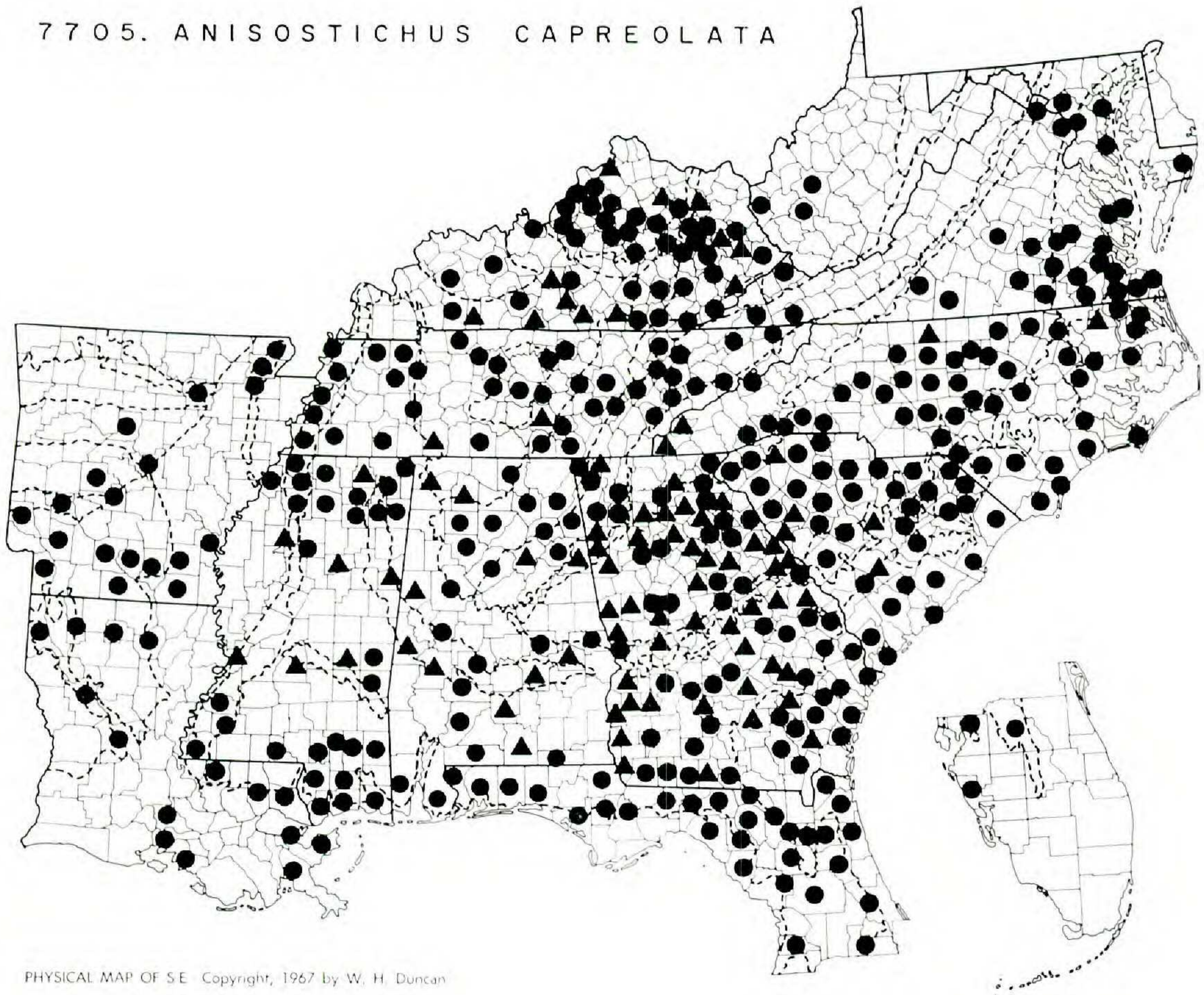
7705. ANISOSTICHUS CAPREOLATA



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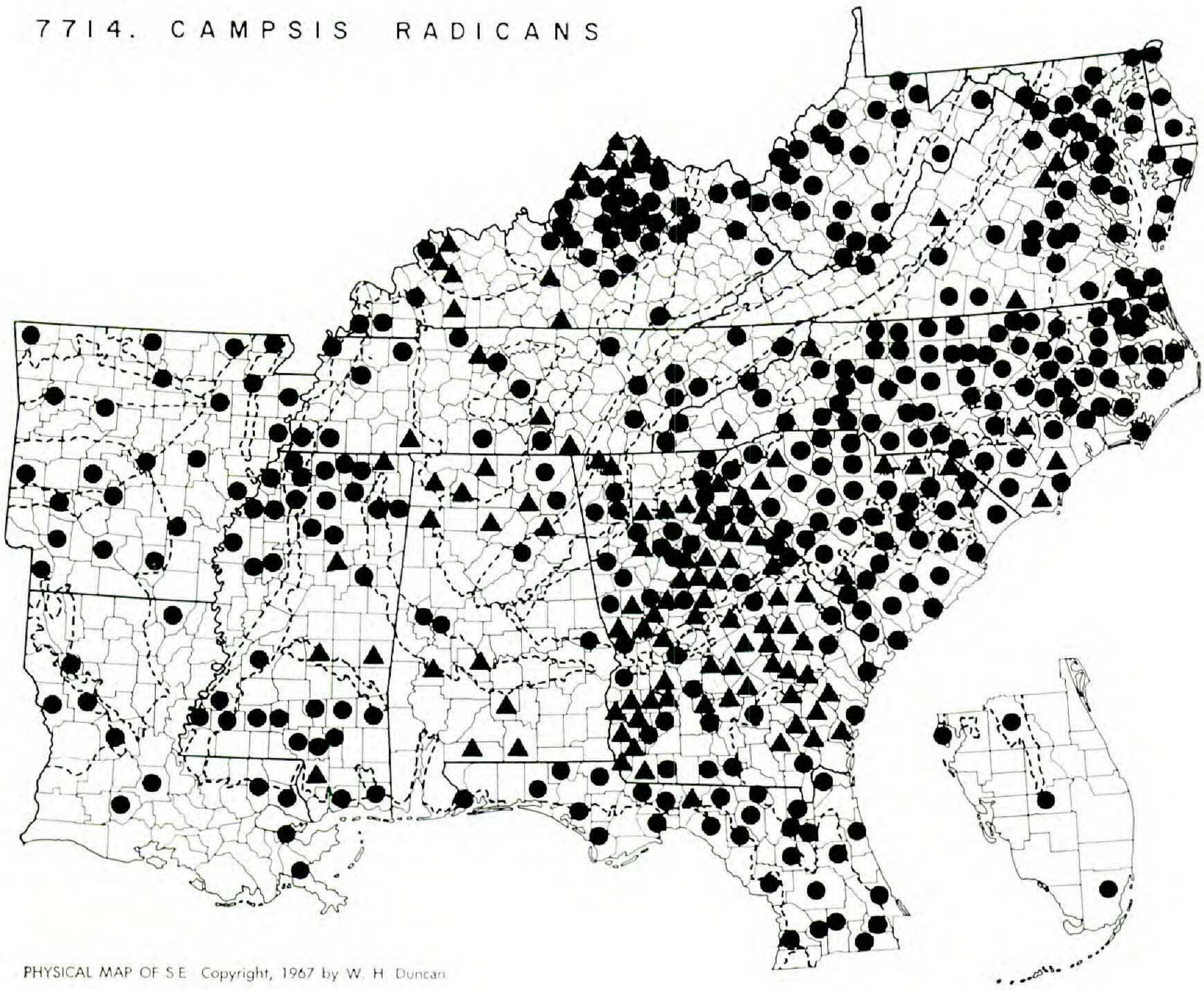
7714. CAMPSIS RADICANS



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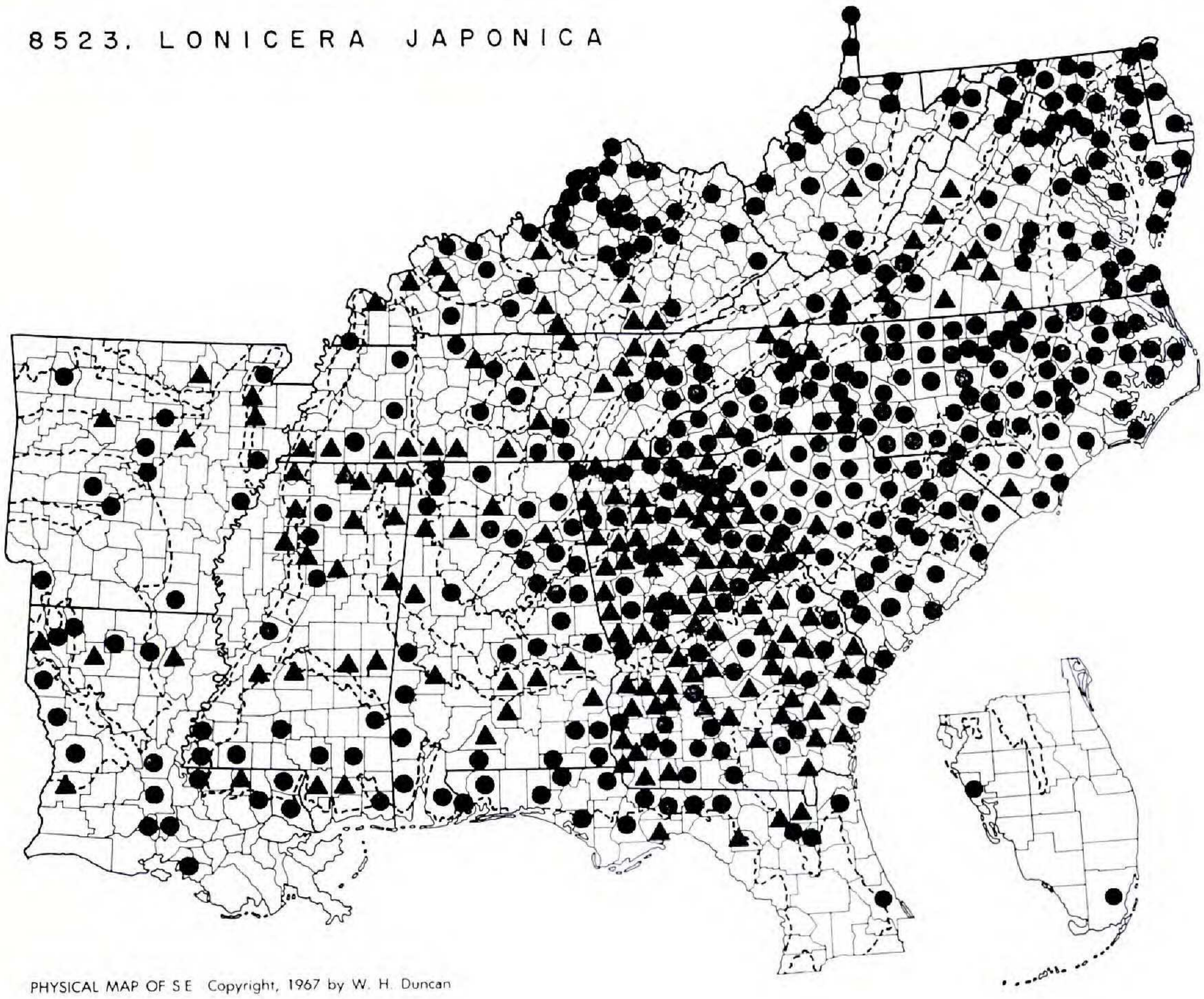

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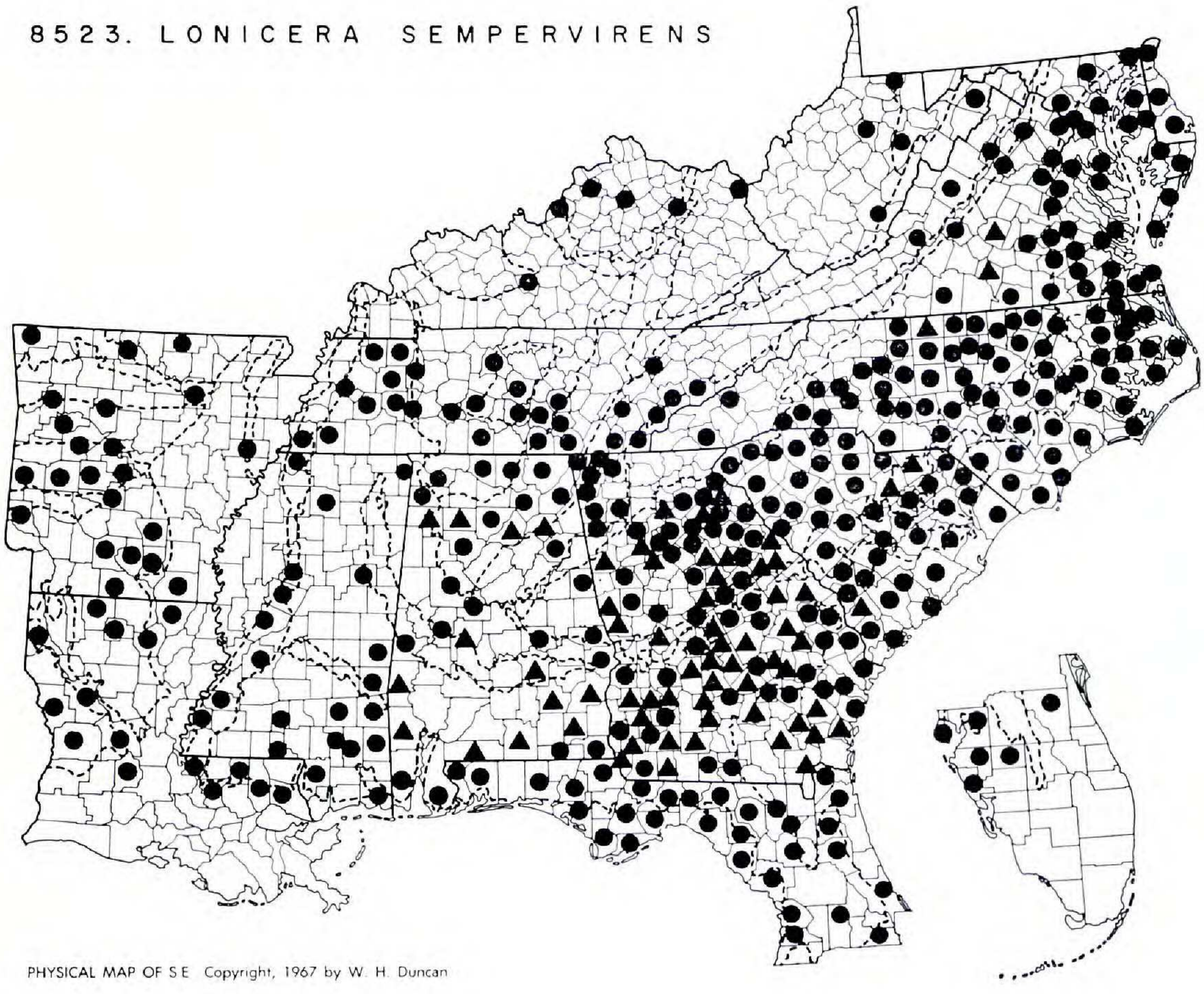

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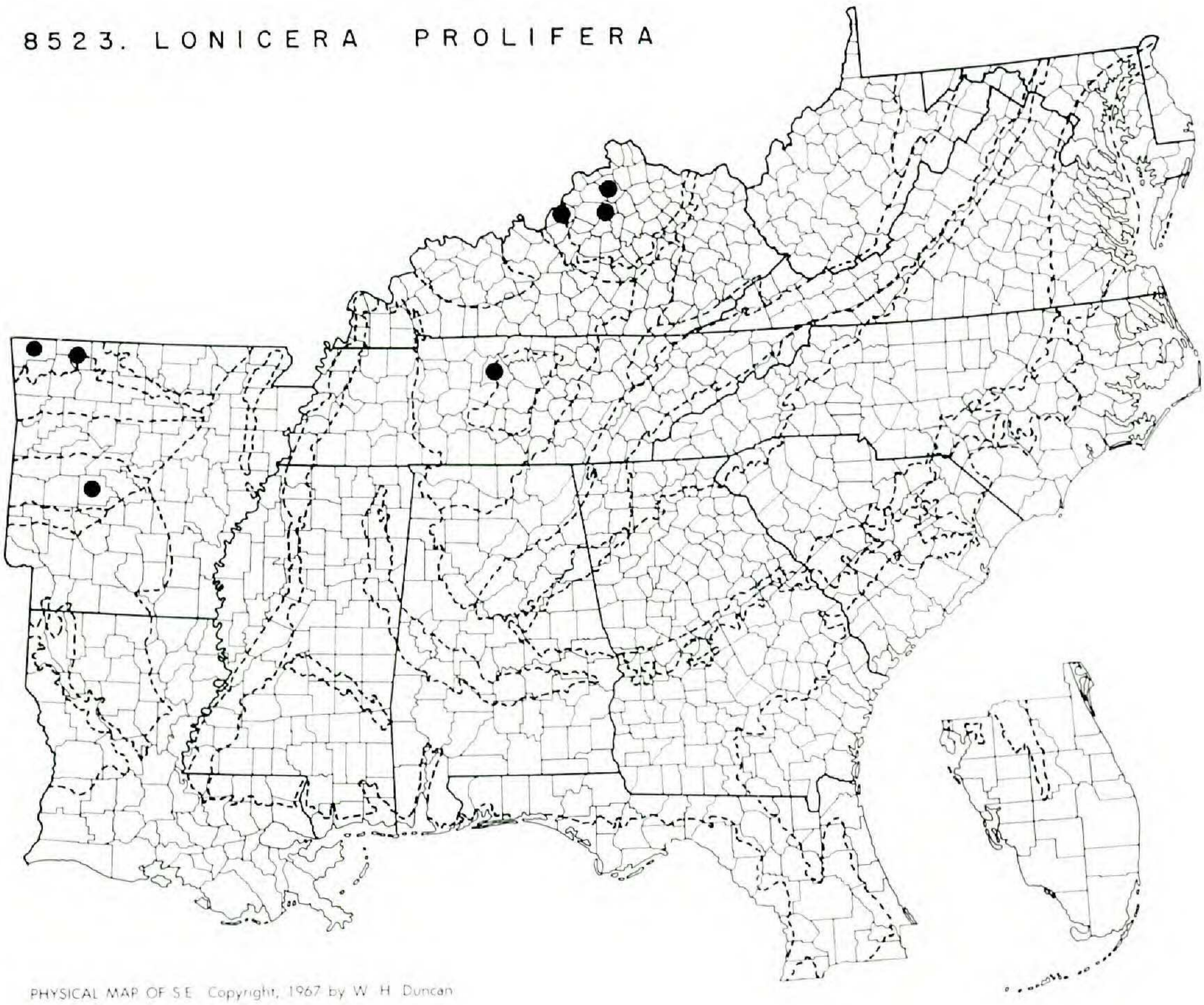

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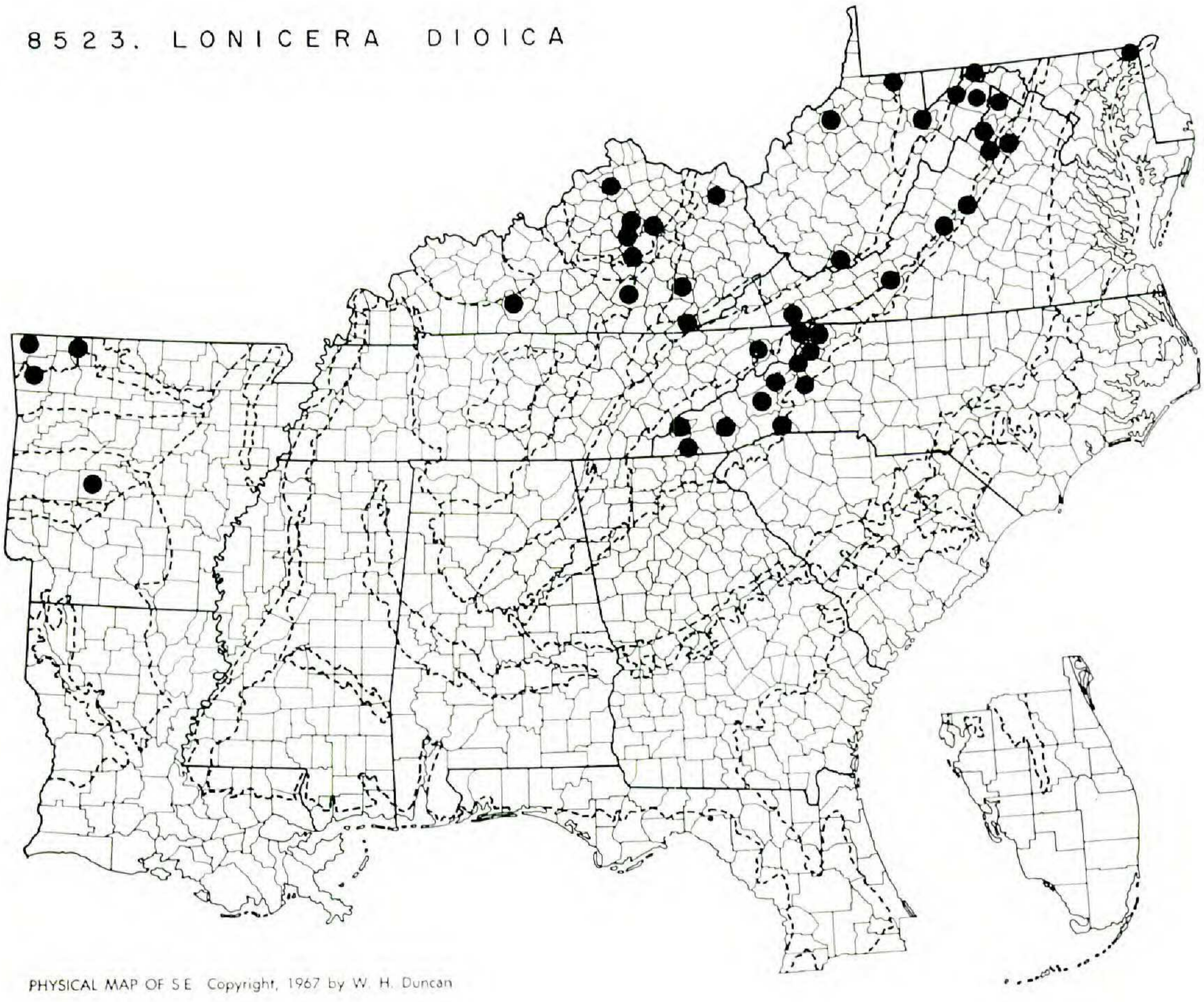

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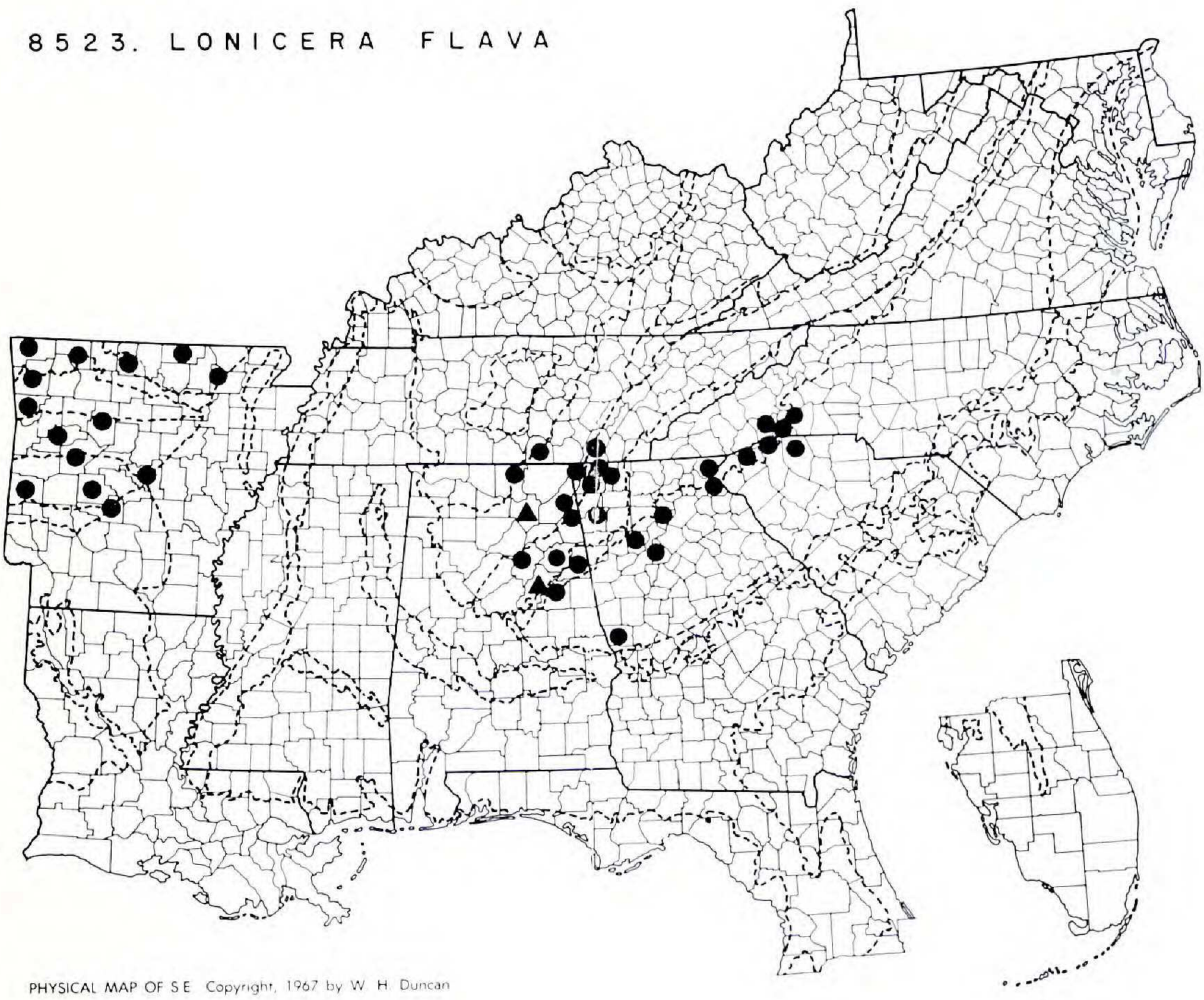

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